

MAGNETIC
& MINERAL SPRINGS
OF
MICHIGAN.
BY STILES KENNEDY M.D.

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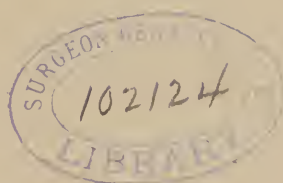
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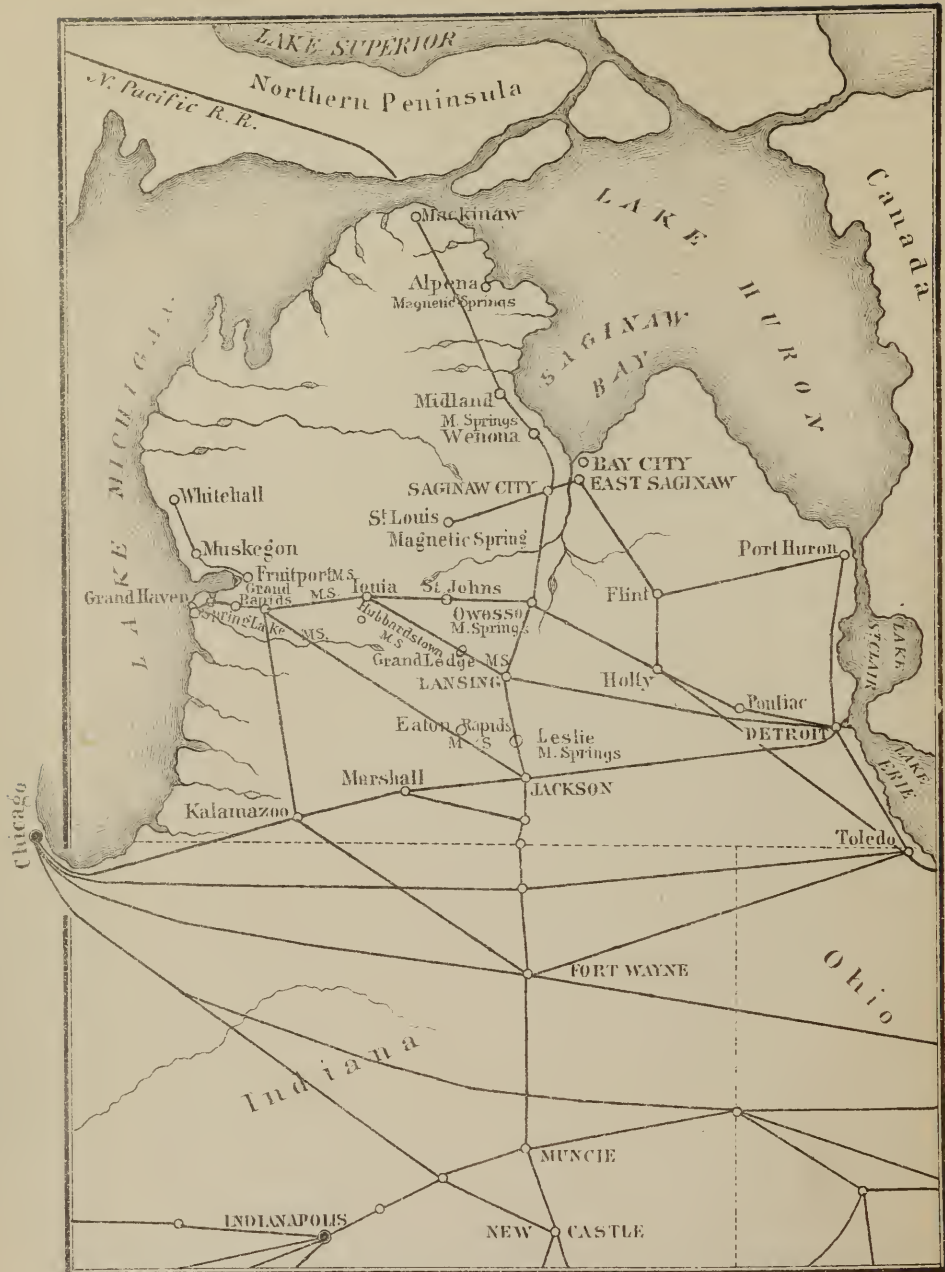
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MAP SHOWING THE LOCATION OF THE VARIOUS MAGNETIC AND MINERAL SPRINGS OF MICHIGAN, AND THE RAILROADS LEADING TO THEM.

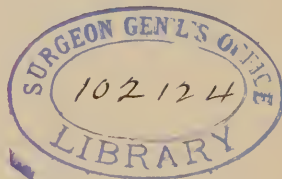
ERRATUM.—During last Winter, 1871-72, a Rail route was opened from Toledo to Holly, connecting with the Flint and Pere Marquette R. R., making a short line between Toledo and East Saginaw. This road should also appear on the Map extended from East Saginaw to Reed city, a town near lake Michigan, about half way between Grand Rapids and Grand Traverse. Midland Spring is on this road instead of being as represented.

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THE
Magnetic and Mineral Springs
OF
MICHIGAN,

TO WHICH IS
PREFIXED AN ESSAY
ON THE
CLIMATE OF MICHIGAN,

BY
STILES KENNEDY, M. D.



WILMINGTON, DEL. :
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1872.

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PREFACE.

THE Medical profession of this country has been thoroughly disgusted and prejudiced against the whole class of Mineral Springs by the incessant proclaimings of interested parties of the discovery of new Siloams, Bethesdas, Abanas and Pharpars. Yet as there has been for two or three years, no inconsiderable excitement over the discovery of Mineral and Magnetic wells in Michigan of surpassing curative properties, the subject seemed to be of sufficient importance to warrant an investigation. Before these waters were analyzed the most wonderful statements were circulated regarding cures of the lame and the afflicted by their use alone. Chemists finally brought out their analysis, and proved that there was indeed at these Springs much to hope for in the alleviation of the maladies of mankind.

I chose to make a thorough investigation of the medical virtues of the Mineral and Magnetic Springs of Michigan, and of the suitableness of that State in other respects as a resort for invalids, and for that purpose spent last Summer (1871) in Michigan.

This object was facilitated by accepting the position of Resident Physician to the St. Louis Springs. Here I met some twelve hundred persons from all parts of the United States with every imaginable variety of chronic disease.

This volume may, therefore, be looked upon as a Medical Report of my observations on the effects of the waters and climate of Michigan in disease.

For reasons set forth in the Chapter on the "Therapeutic Effects of Mineral Spring Waters," and from the unqualified approval by the profession of a former attempt, I have in this work adopted the clinical plan of demonstrating my own views of the Therapeutics and Practice regarding these waters, as being most satisfactory to all concerned.

I am indebted to the publishers for much liberality in the execution of their work, and a great deal of patience in conducting it through the press, during my absence from home.

STILES KENNEDY, M. D.

NEWARK, DEL., April 29, 1872.

CHAPTER I.

PHYSICAL CONFORMATION OF MICHIGAN.

Michigan consists of two peninsulas. The upper or northern one, is formed by Lake Superior on the North, and Lake Michigan on the South ; the two Lakes joining at Mackinac Straits.

The lower or southern peninsula, or Michigan proper, is bounded on the East by Lake Erie, Lake St. Clair, and Lake Huron, joining at Mackinac Straits Lake Michigan, which forms the western boundary. In the following pages the name Michigan will refer only to the lower peninsula unless otherwise mentioned.

Michigan is nestled in these great Lakes between the parallels of 42° and 46° , and between the meridians of 86° and 88° , containing an area of 45,000 square miles. The surface is moderately undulating from the shores of the Lakes toward the interior ridge, where it is some three hundred feet above the level of the Lakes, and about one thousand feet above the level of the sea. When we remember that the waters of these Lakes are from five hundred to one thousand feet deep, Michigan presents the appearance of a vast sugar loaf capsized and a little more than half submerged in a great fresh water ocean, which has washed more or less irregular indentations on its sides.

The soil is a sandy loam but far more fertile than most lands of that character, Michigan being one of the best wheat growing States of the Union. The poorer lands of the State are on the western and northern boundary, being drift sands from Lake Michigan ; western winds prevailing most of the year. But even in that portion of the State there is much fine land.

Scattered over the State are several hundred small Lakes

or Lakelets, varying in size from a few hundred yards to several miles in length and breadth. These little Lakes, as a general rule, are to be found at the mouths of short rivers, or near the sources of long ones; certainly around the Eastern shore of Lake Michigan and the Northwestern shore of Lake Huron this would appear to be the case.

Michigan is covered with vast forests. In the central and upper portions of the State, the river-courses are lined for miles on either side with the Pine, which, after felling and sawing, constitutes the "white pine" lumber of commerce. There are also large forests of the hard woods, such as oak, beech, maple and black walnut.

These points in the physical geography of the State will be referred to more fully in the chapters on "Climate," and "Resources."

CHAPTER II.

THE CLIMATE OF MICHIGAN.

The sun being the source of nearly all the heat of the external portions of the Globe, it necessarily follows that the position of any given portion of the earth in relation to the sun, is the great central determining circumstance or cause of its climate.

If the earth were a level surface of uniform character, the effect of solar heat would be exactly the same at all points of any one parallel of latitude. The effect would be more intense wherever the sun was vertical, and temperature would decrease in other portions of the globe in exact proportion to the obliquity of the solar rays falling upon such places. There would be no difficulty in calculating with exactness the temperature of any spot on earth.

The surface of the earth not being of uniform character and level, the solar agency is modified by every departure from the standard assumed.

Every considerable elevation of the surface, the proximity of large bodies of water, of immense tracts of forests, in fact the whole Physical Geography of a country has a direct and important bearing upon the climate of that country.

The study of the action and re-action of the beautiful and diversified forms of nature presented in Michigan upon the climate of the State is full of interest. Indeed, some of the climatic variations induced in this region by powerful natural causes can be found no where else on this Continent, and they must be studied and appreciated there, if at all.

SEC. 2. INFLUENCE OF THE LAKES.

The lakes surrounding Michigan have, combined, a superficial area of over seventy thousand square miles, or

surface as large as that of all New England, New York, and Pennsylvania ; with an average depth of seven hundred and fifty feet.

Now it is well known that water is heated by the sun much less readily than land, and that it is much slower in giving up its heat, when once warmed. Most of us see this illustrated every year at the approach of the warm season. The earth soon becomes warm to the barefooted boys, they very naturally think the water is of the same temperature, and they post off to "take a swim." My experience is that the same set of boys do not "try the water" but once, future experiments in that line are made by another set. In the fall, however, when the cool nights have made the boys pull on their boots, if they should go to their swimming places they would find the water quite comfortable. In the first case the ground is raised twenty or thirty degrees of temperature, while the water is scarcely affected ; in the second case the earth has been chilled by a few frosty nights which made little or no impression on the water.

The larger the body of water the more distinctly are these facts observed. Lake Michigan has a temperature not exceeding 46° Fah. in summer, and this water gives up its heat so slowly that at no time in winter does the temperature sink below 40° Fah.

Another important source of thermometric constancy in the water of these Lakes is their great depth ; they go down into the very bowels of the earth.

Explorers into the interior of the earth find that as they descend, after leaving the influence of the surface, the temperature increases at the rate of about 1° Fah. for every fifty feet of descent.* The mean depth of the Lakes being seven hundred and fifty feet, gives at their bottom an increase of 15° F. temperature. This heat is of course constant, being far below all surface influences, and its effect is to increase the temperature of the superficial waters at least five to seven degrees. (*Rees. Encyclopedia.*) Here then, by solar agency and the in-

* This statement is questionable. See "Nature," Vol. 4.

ternal heat of the globe we have a vast inland ocean of fresh water maintained at almost an even temperature the year round, in the midst of an immense continental expanse where the mercury passes through one hundred and twenty-five degrees in the shade, on the F. scale of the thermometer. In mid-winter while the land temperature is 20° Fah. and below, these Lakes become great basins of relatively warm water, ameliorating the severities of the climate around them ; while in summer when the mercury every where is running up to 90° and beyond, these same Lakes become great reservoirs of relatively cold water, refreshing and invigorating all who breathe their atmosphere. The winters are thus made warmer and the summers are made cooler ; the climate is equalized—the extremes of temperature are mitigated.

So far as the climate of Michigan is concerned, the most important body of water is that one bearing the name of the State. This arises from no other fact than the one mentioned of the prevailing winds being from the west ; so that they must be tempered in passing over the Lake's surface, partaking to an appreciable extent of its temperature.

The small Lakes before alluded to, also play an important part in modifying climatic excess.

INFLUENCE OF THE LITTLE LAKES.

They doubtless extend the area of the influence of the great Lakes, by acting as reserves or reinforcements to the effects produced on either shore, and carrying the intensity of them well into the interior of the State, or to the opposite shore.

This effect is shown by the fact that frost appears much later along the borders of these Lakelets than it does a few miles from them.

It is also probable that these small Lakes perform important offices in the drainage of the country in which they are situated, acting as large reservoirs for the reception of water which would otherwise rest upon great tracts of land and by its evaporation unduly increase the humidity of the atmos-

phere, or provoke those excesses of climate it is calculated to mitigate, when collected in sufficient quantities.

Besides, by being spread out over large tracts of land, it not only would seriously interfere with agricultural pursuits, but would, by its drying up, increase very much all sorts of malarial disease.

Again, during severe and protracted rains, these Providential receptacles may preserve the country from inundation, and the destruction of property and life, and the production of disease which frequently follows great freshets. By holding in check enormous quantities of water falling suddenly upon the earth, torrential streams are prevented from cutting down river banks and filling up their beds and mouths with sand and drift.

On the other hand, during a season of drouth, these little Lakes may act as natural irrigators of the domain, the water infiltrating the lower portion of earth, perhaps, for a considerable distance beyond the borders of the Lakes, the moisture reaching the surface by capillary attraction—and withal, these diminutive Lakes furnish the inhabitants of their vicinage a cheap and healthful food, and to the seeker of health and pleasure a delightful exercise and enjoyment in following the devotions of Isaac Walton.

SEC. 3. INFLUENCE OF FORESTS.

The relief afforded by forests against climatic severities has long been recognized, but the philosophizing of Physicists in regard to it is exceedingly contradictory and unsatisfactory.

It is probable that the most important effects of timbered tracts in Michigan, are those produced by protecting the ground from the hot rays of the sun, thus preventing the extreme of heat in summer, and by sheltering the ground in winter and protecting its snow-covering, thus checking extreme cold. I do not remember any recent observations establishing the difference of temperature in woods and open field, but probably the following table taken from Dr. Williams's work will answer the purpose.

The observations were taken near Cambridge, Mass., at a depth of ten inches below the land surface. It would be interesting to know the temperature of the atmosphere at the same times and places, but it has not been given.

TIME.	OPEN PASTURE.	WOODS.	DIFFERENCE.
May 23d,	52 deg.	46 deg.	6 deg.
„ 28th,	57 “	48 “	9 “
June 15th,	64 “	51 “	13 “
“ 27th,	62 “	51 “	11 “
July 10th,	52 “	51 “	11 “
“ 30th,	65½ “	55½ “	10 “
Aug. 15th,	68 “	58 “	10 “
“ 31st,	59½ “	55 “	4½ “
Sept. 15th,	59½ “	55 “	4½ “
Oct. 1st,	59½ “	55 “	4½ “
“ 15th,	49 “	49 “	0 “
Nov. 1st,	43 “	43 “	0 “
“ 16th,	43 “	43 “	0 “

It will be seen that the mean temperature of the woods for nearly five months is 8° cooler than the open land.

It will also be observed how much more rapidly the open land gets warm in the spring. The first note taken makes a difference of 6°, but in a few days while the woods are getting two degrees warmer, the pasture by the direct action of the sun's rays has become seven degrees warmer, making a difference of 9°.

In two weeks more, June 15, the woods have only gained three degrees of additional heat since last note, while the pasture has gained seven, making a difference of 13°. Of course this difference could not exist long, but we find that during the month of June and first part of July the wood's temperature is steadily maintained at 11° lower temperature than the pasture.

The hottest season of the year now comes and the woods are still kept 10° cooler than the open field. After this the difference gradually lessens so that by the middle of October the two thermometers indicate the same temperature. The mercury in the woods during four and a half months having passed through thirteen degree on the scale, while the one in the field passed twenty-five of them.

If these observations had been continued during the succeeding months from November to April, the following changes would probably have been noticed. The mercury in the pasture thermometer would have fallen much more rapidly than the one in the woods, because the field being unprotected would have been directly susceptible to all the natural changes of open land, such as rapid irradiation of heat, especially after the wind had dried the soil thoroughly, while the soil of the woods would have been protected by a bed of leaves and other dead matter and by living growths. So that when the field would be quite frozen, the woods would remain for a while at or about the temperature of 40° . After some continuance of cold, at the shallow depth at which the thermometers were placed they both might stand alike, but at the approach of spring, even if a difference had been maintained in favor of the wood's temperature up to that time, the field would warm sooner than the woods, and raise the mercury in its thermometer up to a level with that in the forest. The same changes would then take place as set forth in the table.

Forests also serve to equalize the amount of moisture in the atmosphere. When the air is saturated with moisture, the excess, or a large portion of it, is absorbed by the leaves, and when the atmosphere becomes, from any cause, excessively dry, moisture is exhaled from the leaves to aid in making up the deficiency.

When situated to the windward of malarious districts, forests afford considerable protection against its effects, especially if the forests are dry and have a light soil. I have very often noticed the beneficial effects of skirts of timber in this way in the southern states. The custom in some places of planting sun flowers around the houses is therefore founded on scientific deductions. It is probable that trees have a specific heat of their own, heat evolved in the vital processes of vegetation, and if this is the case, it certainly aids in equalizing temperature. At any rate the roots of trees sinking deep into the earth partake of the temperature of the earth, which a few feet below the surface is nearly constant, and this tem-

perature is conducted by the roots to the surface where it is set free in winter, while in summer, the heat of the atmosphere and surface soil is conducted below.

One of the greatest benefits derived from forests is the mechanical resistance they offer to the bleak winds. No persons can appreciate this more than the lumbermen of Michigan, who are enabled to work in the woods comfortably during a winter with severe winds, at a temperature that would be unbearable in the open field with a light breeze.

The soil of woods is generally light and bibulous, filled with the roots of trees and undergrowth, and covered with the annual deposit of leaves and sticks. Here, then, is a surface adapted to the holding, by saturation, an immense quantity of water, a reserve for supplying water courses, for preserving atmospheric humidity by a slow but constant evaporation, and by absorption and exhalation. By the obstacles it offers to the rapid passing off of large quantities of rain water it prevents the sudden inundation of streams. (*Man and Nature, Marsh.*) When the woods are removed, however, the hot rays of the sun strike into these accumulated deposits of dead organic matter, and malarious gasses are speedily generated. This is one reason why in all new countries there is more or less malaria.

The influence of forests on the electrical condition of the atmosphere is a very interesting and important subject. It has been ascertained by experiments of Du Bois-Raymond and others, that the internal parts of plants and the roots (sap being necessary) are negatively electrified, and the internal parts of leaves, green twigs, flowers, and fruit, are in a permanent positive electrification*

We also know that the atmosphere is in a state, generally, of positive electricity, for in 2124 observations made by Dr. Wisligenus† at regular hours, the atmospheric electricity was positive 2046 times and for the negative condition 78 times.

Of the 78 times, 30 were connected with storms and either hail or thunder and lightning, 23 by rains, 20 by high winds

* Beard and Rockwell's Electricity. † Ferguson's Electricity.

and gales, 4 by snow, and 1 by fog. For a long time hail storms have been supposed by many to be of electrical origin, and when we remember that with the removal of the forests in some of the European states hail storms the most violent and destructive have frequently devastated the most fertile and beautiful sections of that country, the conclusion is almost irresistible that the vast tracts of woods with their countless millions of electrical conductors play an important part in the preservation of the equilibrium of atmospheric electricity. That this equilibrium occupies an important part in the maintenance of health is shown by the commonly observed fact that rheumatic, neuralgiac, and many other persons suffer a great increase of pain on the approach of a storm when the electrical conditions of the atmosphere are changed.

SEC. 4. INFLUENCE OF WINDS.

The temperature of a country is increased or diminished by winds, according as they come from a hot or cold expanse. Therefore wind may be regarded as the medium of climatic equalization. If it were possible for the atmosphere to remain perfectly quiet, no ameliorating influence could be brought to bear upon astronomical temperature. Altitude wraps the summit of the Rocky Mountains in frost, but it is the wind that bears its delicious coolness a hundred miles away to the pillow of the invalid in the plains below, and gives him refreshing sleep and renewed strength. The Lakes give to its atmosphere a lightness and warmth in midwinter, and the wind bears it to the peninsula and beautifully softens the climate.

In winter, as a rule, winds blowing over vast tracts of land are cold, while those sweeping over large bodies of water are warm, and the reverse of this is true in summer. On the Atlantic seaboard we dread "Northwesters" during the winter solstice, yet in England they are warm winds.

The prevailing winds in Michigan are from the West during the Fall, Winter, and Spring months. In winter, the West wind is nearly constant, at least the proportion of West

to East winds is 8 or 9 to 1. A singular fact in connection with this subject is that, while Western Michigan is being bathed in the comparatively mild winds from Lake Michigan, the Eastern side of the State is receiving a large proportion of the winds from Lake Huron, being of course east winds. The ratio standing 162 Lake winds to 300 Land winds. As the season advances this ratio is gradually increased until at the approach of summer the winds off Lake Huron are in greater number than those blowing from the West. The cooling effects of these Summer winds are therefore mostly felt in that part of the State in a line west of Saginaw Bay and to the North of it.

Winds by causing rapid evaporation of the moisture of soil have a very decided cooling effect, as long at any rate as there is any moisture. When the moisture is exhausted the effect of the solar heat is much greater.

Winds evaporate snow rapidly even in the coldest weather. We have all remarked the snow leaving open fields much sooner than it does the woods, although the latter are of a higher temperature ; the soil is thus left bare to the fury of the elements.

A very considerable amount of evaporation takes place by the action of the winds on the leaves of trees, and this is one reason why forests are cooler than openings.

SEC. 5. INFLUENCE OF ALTITUDE.

As altitude increases, temperature becomes lower at the rate of 1° for every 350 feet of ascension, consequently, by ascending the Andes one would meet and pass through just the same climate, so far as temperature is concerned, as if he were to travel through thousands of miles of latitude. Indeed that factor of climate as a whole, depending upon its height above sea level is about the most stable and easily calculated, for there are not so many perturbing circumstances to modify our balances.

If one is placed at the foot of a high mountain, no matter where, he will find the vegetation of the latitude

in which it is located ;—if in the Tropics, the Palm, the Bamboo, and Tree Fern ; as he ascends, these will give way to the Oak, Chestnut, and other trees of a latitude much nearer the Poles. These will in turn give way as he ascends to the Pine and other Conifers. Still higher are the dwarf Birches and Alpine shrubs, and then come the Lichens and Mosses of Arctic climates. The influence of altitude on the climate of the mountain is the cause of these successive changes of vegetation.

Therefore we know that countries situated far above sea-level are cooler than others in the same latitude not so situated.

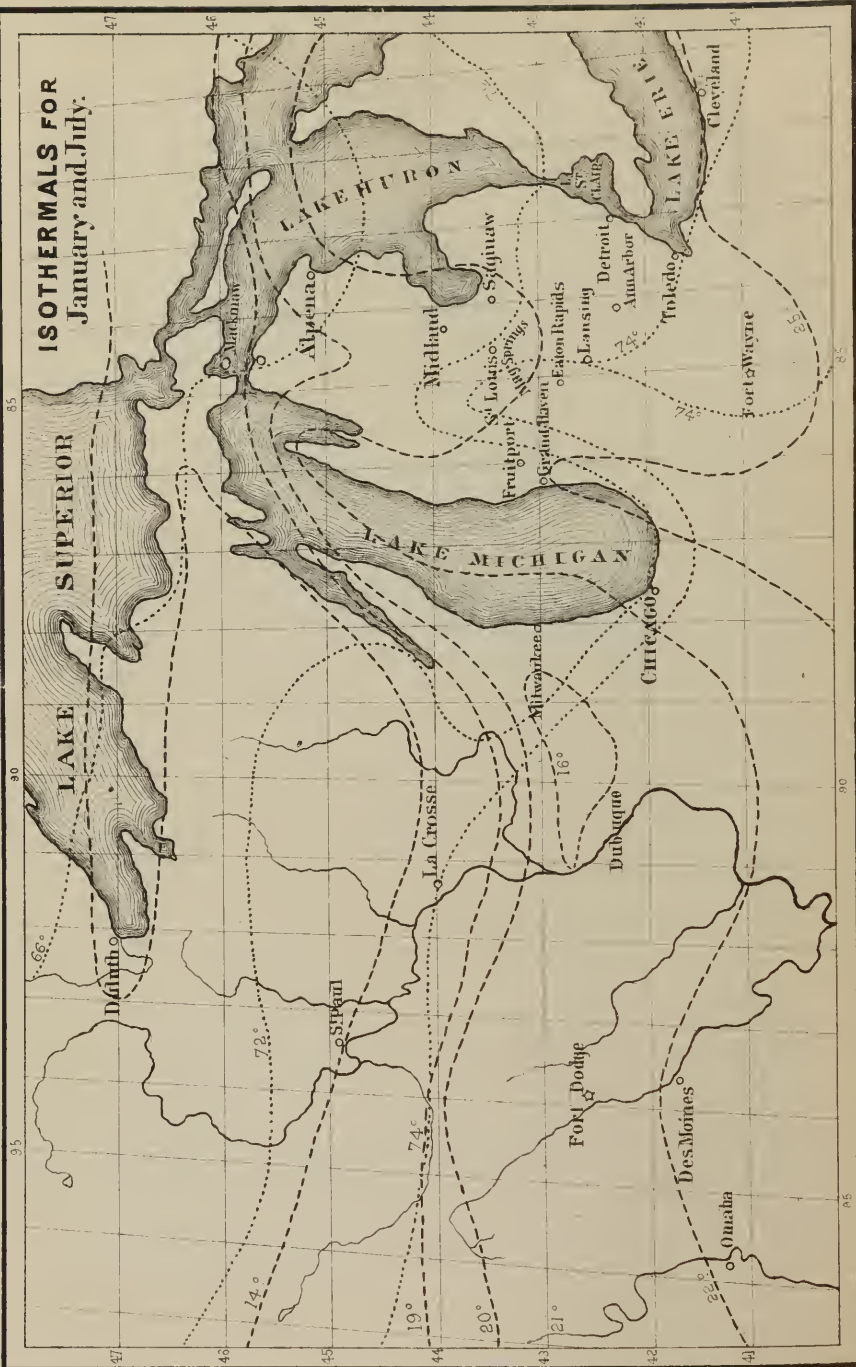
Lake Michigan being about 600 feet higher than the Atlantic, the temperature would be diminished nearly 2° . The central ridge of Michigan being some 300 feet higher than the Lakes, and consequently 900 feet higher than the sea, would have a temperature $2\frac{1}{2}^{\circ}$ lower than that of the Atlantic coast.

SEC. 6. THE SUM OF THESE INFLUENCES.

These are seen in the fact that the mean temperature for January on the Wisconsin shore at Milwaukee is $20\frac{1}{2}^{\circ}$, while on the same parallel on the Michigan shore at Grand Haven the mean temperature for the same month is 25° . This is unquestionably the influence of the Lake only. The difference is more striking as we go back from the shores. A few miles west of Milwaukee there is a considerable tract of country where the mean temperature for January is 16° , while at St. Louis springs which occupies about the geographical center of Michigan, the mean temperature is only $22\frac{1}{2}^{\circ}$, and none of the isothermal lines that enter Wisconsin at and above La Crosse, enter Michigan proper, at all; they are deflected, and bent upon themselves by the influence of this Lake, and Lake Superior so that they pass out through the West end of the latter Lake.

Another striking singularity is this : that the only isothermals for January that reach Michigan from Wisconsin are those bearing the temperature of 19° and 20° . These two

ISOTHERMALS FOR January and July.



lines enter southern Wisconsin at Prairie Du Chien and pass obliquely northward and enter the extreme northern point of Michigan proper at Mackinac, two hundred miles farther north than Prairie Du Chien.

The modification of the climate of Michigan by these influences, is just as striking for any month of the year as for January.

By looking at the map, the July isothermal of 72° is seen entering the North West corner ; this line is barely deflected one degree of latitude in passing through eight and a half degrees of longitude. Suddenly however coming under the influence of the lakes it falls through three degrees of latitude in nearly the same meridian, bringing it to Chicago ; from there it gradually rises to the center of Michigan, where, coming under the influence of Lake Huron, it is again deflected southward.

Thus the average July temperature of Central Michigan is 1° cooler than St. Paul, Minnesota ; a place more than one hundred miles farther North.*

The severity of winter is so much mitigated on the western slope of Michigan that some of the most delicious fruits of more southern latitudes are grown with success. This section of the State is known as the "Fruit Belt," and frequently the writer was told while there, that in a few years, when the woods are felled so as to let in the warm air from the Lakes, that this belt would be widened and gradually extend across the State. This is the firm belief of many of the farmers and citizens of Central Michigan.

The writer is only sorry that he cannot enjoy this happy anticipation with them. The summers will indeed be warmer, but not warm summers alone will make fruit districts. It is extreme cold, even if this extreme is only attained occasionally, that plays havoc with fruit growing, and when the woods of Michigan are removed the central ridge of the State will be farther from the fruit belt than now.

* For an account more in detail of the effects of these lakes on climate, the reader is referred to a paper with two maps in the proceedings of the American Association for the advancement of science for the year 1870, by Professor Alexander Winchell, State Geologist. The map here shown is taken from his two.

CHAPTER III.

MALARIA IN MICHIGAN.

VISITORS NOT LIABLE TO MALARIOUS DISEASES.

Malaria is an annual production of nearly every section of the United States. No State is entirely free from it. The Western States for well-known reasons, have gained considerable notoriety for the number and frequency of Malarial diseases, within their borders. These diseases in Michigan, among natives, are of the mildest forms, much milder than those on the Chesapeake peninsula, to say nothing of the severer forms seen on the Virginia low lands, or in the Carolinas.

I have taken special pains to ascertain the proportion of visitors to Michigan who became affected with Malarial disease in any form last season, (1871), and probably there was not greater than 2 per cent. so affected. Of this number fully $1\frac{1}{2}$ per cent. were previously from malarious districts, while nearly the whole of the other $\frac{1}{2}$ per cent. chose very unfavorable quarters while in the State. Exceedingly few cases were found where one or the other of these circumstances did not prevail.

It is well known that a person may live in a malarious district of country for years and never be troubled with any of the diseases peculiar to the neighborhood, until he moves out of it. This fact has been corroborated in Michigan, and that State has gained the credit of causing the disease. No doubt if the visitors should remain many months exposed to the malaria of Michigan they would become affected by it, but the prevailing mildness of the types of these diseases usually seen among the natives of the State, would impress one with the necessity of considerable time to make an impression on one who is an entire stranger to such influences.

SEC. 2. INFLUENCE OF FOREST FIRES.

A writer has computed that not less than 480,000 acres of timbered land was burned over during the great conflagrations in the northwest last autumn, 1871. He estimates, as a chemical result of this immense burning, that not less than three million tons of carbon has been liberated from its union with other elements. Every three pounds of this would take up eight pounds of oxygen, forming eleven pounds of carbonic acid gas. This increases the present quantity of that gas in the atmosphere twelve million tons, or one part to every sixteen hundred, normally existing there; while the normal atmospheric oxygen has been decreased one part nearly in a million, or an amount equal to the supply of the earth for ten months.

If the carbonic acid gas of the atmosphere has decreased one part in five thousand each century since the carboniferous era, then the north-western fires have restored the atmospheric condition of three hundred years ago.

The effects thus produced are *general*. State, nation, continent, and hemisphere are affected alike: but there are certain local effects, effects upon the State and its climate, which come more clearly under the purpose of this work.

200,000 acres of heavy woodland were burned in Michigan, and about an equal area of pasture, grass and grain-fields, including clearings and openings, were also burned over. Of course the first effect of this will be an almost entire abolishment of all those influences attributed in the preceding pages to growing forests. In the next place the annihilation of almost incalculable quantities of dying and decaying vegetation, the accumulation in the woods of the falling leaves, twigs and branches of centuries, forming the light spongy texture of many inches in depth with which all are familiar who walk through woods, and in which decay, decomposition, and the evolution of malarial gasses is slowly going on, and which is immensely increased wherever the woodman's axe allows

* Lake Side Monthly, Chicago, January, 1872.

the sun to enter. The vast quantity of green forest leaves just on the point of increasing the great accumulation, and the annual death of the pasture, grass, and grain fields with their decomposition just at its height, was all swept away as by the very besom of destruction. Large tracts of land were left as destitute of vegetation as the desert of Sahara, while on other tracts nothing was left but blackened pillars which seemed to mourn over this terrible desolation.

But with such an immense destruction of vegetable matter, it is impossible to conclude otherwise than that the quantity of malaria must be vastly diminished as well as all those diseases which are produced and aggravated by it.

The woods thus destroyed can now be cleared of the charred trunks, (still good for sawing), without fear of an atmosphere reeking with the effects of decomposition produced by the heat of the sun on decaying vegetation, for this latter has been swept away by the blaze.

It might be supposed that the ingress gained by the sun to the low swamps of the woods, would cause, at least in many localities, a large increase in Malarial poison, but the fact of the fires occurring at the dryest season, after an almost entire absence of rain for many weeks, while the low lands were perfectly dry, and the great intensity of the fire causing the utter destruction of every vestige of life on the surface of the ground, dispels such an idea.

What has been said regarding the destruction of vegetable life applies with equal force to the myriad millions of animal life, such as insects, reptiles, and the whole list of smaller animals which abound in forests where inroads have been made. The result of animal decomposition is supposed by good authority to be a more serious cause of malarial disease than vegetable decay. If this view be correct, then the prevention of this immense annual decay by the blaze, is a positive health-measure.

CHAPTER IV.

MAGNETIC AND MINERAL WELLS.

HISTORY OF THEIR DISCOVERY.

During the summer of 1869 a company began boring the earth at St. Louis, Gratiot County Michigan, for salt water, with the intention, if successful, of establishing a salt-works. As the auger went down it passed through the following geological formations :

Clay, gravel and small boulders	40 feet
Blue clay	30 feet
Fire clay	13 "
Sand and gravel	39 "
Slate running into fine slate	15 "
Coarse sand and gravel	55 "
Small stones	6 "
Rock	2 "

Making a total of 200 feet bored. The diameter of the tubing was $3\frac{1}{2}$ inches and it delivered 300 gallons of water per minute, and forced it 24 feet above the surface of the earth.

The water was beautifully clear, sparkling and cold—50° F., and to the taste barely perceptibly alkaline. The water was not saline, and for manufacturing purposes it was abandoned. But its beauty and temperature and stimulating gases made it the popular drinking water of the town, and many used it for household purposes. The town council talked of buying it to supply the town with water. It was even proposed to lay pipes to Saginaw, thirty miles distant, and convey the water there for the use of the town for ordinary purposes. These schemes were however abandoned, and stock in the "St. Louis Salt Company" was about as flat as fresh water *salt* stocks ever get. Things were in this luckless shape, when some fellow loafing around discovered that his knife blade stuck to

the iron tubing that projected a few feet above ground, and from which the water flowed. The tube attracted, and then held like a magnet, his knife blade, and the blade was magnetized so that it would attract and hold such small articles as tacks, needles, watch keys, &c.

This renewed the excitement toward the artesian well, and hundreds came to get their knives magnetized. Articles and utensils of soft steel were subjected to the action of the water alone, and these were magnetized, according to the affidavits of many persons. There was an old paralytic in town who conceived the idea, and a very good one, that water and magnetism if good separately for his disease, ought to be still better if the two were combined, so he began drinking and bathing in the water, and the people in town saw him gradually recover. The excitement at this juncture was intense. Rheumatics bathed and were relieved. Persons troubled with kidney and bladder difficulties drank of it and were relieved. The news of a Magnetic well and of its wonderful curative properties spread like wild fire in its rapidity, so that in two months over two hundred diseased persons were in St. Louis using the water.

The Michiganders did not believe, however, that any special providence had favored this town, and that if there was Magnetic water in one place there might possibly be in another ; so this enterprising people went to boring, and by the season of 1870 they had found no less than *sixty* wells of water, each one claiming to be magnetic. Some twenty-three of these waters have been advertised as containing mineral qualities, and those that have been analyzed show the statement to be correct. The magnetic properties at first claimed have been abandoned by nearly all of them.

The following waters with the analysis of each, its location and other matters connected with it will be noticed in this volume :

St. Louis,	Fruit Port,	Lansing,	Grand Ledge,
Alpena,	Three Rivers,	Albion,	Eaton Rapids,
Midland,	Port Huron,	Grand Rapids,	Lesile,
Muskegan,	Hubbardston,	Owosso,	Rexford.
Spring Lake,	Menominee,	Ostego,	

It is hardly necessary to say now that the "Magnetic and Mineral Springs of Michigan" are not *springs* at all, but Artesian Wells, made by boring the earth to a depth varying from one hundred to several hundred feet. The water does not flow out of all of them by its own natural force, and consequently in many cases it has to be pumped out by wind or steam. Some of the above springs have bath-houses connected with them, differing in capacity, character and convenience. Other springs afford water only for drinking.

SEC. 2. ARE THESE WATERS MAGNETIC?

POPULAR VIEWS.

To the casual observer nothing would seem easier than to prove that certain wells of water were either magnetic or not magnetic.

And yet, as the history of the discussion of this subject will show, there is and has been considerable difficulty in the way. In fact the disputants and experimenters on either side of the question have succeeded better in tearing to pieces the arguments of their opponents than in making whole their own side.

That the iron tubing through which the water flows from some of these Artesian Wells is highly charged with magnetism no one, I believe, now disputes, and it was from this fact that these waters first gained their reputation for possessing magnetic qualities, and this fact alone was cited as sufficient evidence of the presence of the qualities claimed as being in the water, and that the magnetism of the water magnetized the tube.

In opposition to this view it is very justly maintained that iron tubing, rods, or pillars, placed in a line approaching the magnetic dip will become charged with terrestrial magnetism by induction, no matter whether these articles be in the ground or on it, and that the tubing of these wells gains its magnetism in this way.

Granting the full force of this truth, it does not, however, prove that the water may not also be magnetic in the same

wells, or that it may not be magnetic in any other well than the one examined.

The water used by Prof. S. P. Duffield was from the St. Louis well. I believe he conducted a portion of his experiments at the well. What the character of his investigations were I do not know, but they seem to have been at least satisfactory to him, for he says in his report on the analysis of this water, "Before making any report on the medical properties of the spring, I wish to call attention to the fact of the current of electricity or magnetism, (time and experiment must develop which) that the stream of water carries." Detroit, September 23d, 1869.

During the winter of 1869-70 I tried some crude experiments, by placing small steel rods in jars holding water from the St. Louis well and I found that they invariably gained magnetism. *Med. and Surg. Reporter Mch.* 70.

SCIENTIFIC EXPERIMENTS.

Prof. Winchell of the University of Michigan made some 200 experiments with Eaton Rapids water, and in a paper read before the American Association for the Advancement of Science, 1870, comes to the following conclusions :

"Mineral waters of Michigan tend to induce polarity, in the outer end of a rod of soft iron passed through a cork into a bottle of water."

"This property is retained by water, weeks and months.

"A rod of steel or a knife blade immersed in the water from twenty minutes to ten hours, acquires very sensible polarity, though practically neutral before immersion."

To the conclusion drawn from these experiments that the water imparts magnetism to the metals, Prof. R. C. Kedzie of the Agricultural College of Michigan, in an elaborate paper in the *Detroit Review of Medicine* for July 1871, very strenuously objects.

After quoting the above paragraphs from the paper of Prof. Winchell, he explains them by "the re-appearance of our old friend, terrestrial magnetism," and seems to insist that

the iron rods must be placed nearly vertically in the water, and when in that position they become magnetized whether in the water or out of it. While this is true, my own observation is to the effect that, metallic rods acquire polarity much faster while in the water near the vertical position than they do if kept in that position out of the water. Besides, Prof. Winchell states explicitly in his paper, and just after the portion quoted by Prof. Kedzie that, "The fixed polarity communicated to a steel rod lying in a bottle of mineral water twelve hours is sufficient to deflect a bit of wire."

"Steel rods lying thirty minutes in a stream of water flowing from a well over the ground, acquires sufficient polarity to deflect slightly, though they would not do it before." Nor do I think there is the least doubt on this point, though the vertical position, be it observed, is not used. Granting this fact, the question then arises, does this magnetic polarity exist in the water itself? does the water possess polarity, or is the polarity acquired by the steel rods the result of chemical action, the result of the action of the alkalies and salts of the water upon the iron? Prof. Winchell inclines to the latter opinion, and he says, "This supposition is strengthened by the fact that the phenomena are as apparent with rods simply moistened as when they are immersed in water; and further, the magnetic phenomena do not arise from pure rain water (in the best experiment) while they do apparently arise (at least in some experiments) from water artificially salted, or alkaline, and still further by the reputed fact that tarnished knife-blades are more easily magnetized than polished ones.

My own experience does not accord with this except in the extreme feebleness of the phenomena induced by artificially prepared water and the entire absence of it in rain water.

Indeed Prof. Winchell states two objections to the chemical theory. "The apparent loss of magnetic power in a bottle of water 70 days old exposed to light and warmth," and, "If these magnetic indications arise from chemical action, it is difficult to perceive how they could be accompanied by the ordinary galvanic current, since we have not the requisite

electro-positive and electro-negative bodies, unless, indeed, the cork of the glass could serve as the electro-negative element."

I confess that the theory of chemical action in the production of the magnetic phenomena of these waters is very unsatisfactory.

The question now turns upon the existence of polarity in the water itself. The negative side of this argument is given so ably and succinctly by Prof. Kedzie, that I make a lengthy extract from his paper.

"Water in its chemical composition, is a perfectly neutral oxide of hydrogen. Farraday has shown, by very ingenious and convincing experiments, that oxygen is magnetic, while hydrogen, in the gaseous condition, is diamagnetic. Chemists have long suspected that hydrogen was the vapor of a metal, since all of its analogies are of the metallic class ; but the efforts of chemists to condense hydrogen into a liquid or solid were unsuccessful, and hence its metallic nature could only be surmised. But about three years ago, Prof. Graham, late master of the British mint, partially solved the problem by obtaining an alloy of hydrogen and the metal palladium, in which 900 volumes of gaseous hydrogen were condensed into one volume in forming the alloy with palladium. From examining this alloy, Graham deducted that hydrogenium (as he named this metallic hydrogen) is a white metal, with a specific gravity about 2, and that it is distinctly magnetic, belonging to the class of magnetic metals which includes iron, nickel and cobalt.

The admirable researches of Graham having shown that metallic hydrogen is magnetic, and the investigations of Faraday having brought to notice the magnetic quality of oxygen, may not their combination, the oxide of hydrogen, possess magnetic properties? An oxide of iron Fe_3O_4 , having the property of attracting particles of iron, and of imparting this property permanently to steel, was found near Magnesia in Asia Minor. The Greeks gave this ore the name *Magnetes*, from which comes our word magnet. This oxide is called

lodestone in Saxon, or leadstone, from the directive property of the magnetic needle. If an oxide of the magnetic metal iron has magnetic properties, may not an oxide of the magnetic metal hydrogenium also possess magnetism? perhaps it was reasoning by analogy of this kind which first led some of our scientific men to entertain the idea that water might be capable of magnetic polarity.

A sufficient reply might be made that monoxides do not possess magnetic powers of any intensity, but only the combination of the monoxide and sesquioxide, e. g. $\text{FeO} + \text{Fe}^2\text{O}^3 = \text{Fe}^3\text{O}^4$, which has received the name of magnetic oxide. Water is a monoxide, and hydrogen forms no sesquioxide, and a monosesquioxide, or magnetic oxide, is therefore not possible. The later researches of Faraday, however, have shown that all substances except nitrogen are susceptible of magnetic influence."

The main point to notice in giving this quotation the consideration to which it is so justly due, is the fact that only *chemically pure* water, water carefully distilled, a perfectly neutral oxide of hydrogen was under notice, while the water pertinent to the discussion is just the reverse, a chemically impure water, the oxide of hydrogen holding in solution various salts, alkalies and chemical combinations.

Therefore while the proof is competent in one case, it is insufficient in the other. Chemically, pure water is not seen in nature, it is a production of art. Rain water is not pure, common well or spring water is less so, and mineral spring water is still less so, chemically speaking. This view of the error of argument seems to gain at least plausibility by the fact stated by the above writer, that the more recent researches of Faraday, show that while iron, nickel and cobalt only, of all substances, are perceptible to ordinary magnetic influences, yet when magnets of extraordinary power were employed, all substances except nitrogen were found to be susceptible to their influence. May there not be some truth after all in some of the fanciful theories that place scores of enormous magnets in the bowels of Michigan over which these waters, laden with minerals, flow in their rapid exit?

The following experiments were performed by Prof. Kedzie himself, and the objection made above as to the character of the water will not apply here, as I presume he used common water, though he does not say so.

“To test the matter, whether water itself not magnetic, yet flowing from a source or along a channel charged with magnetism, might sweep along this magnetic influence, and thus impart magnetism to bodies placed in the flow of its current, I made the following investigation: I first magnetized an iron tube by applying to it a strong horse-shoe magnet; through this magnetized tube I caused a stream of water to flow, the water passing from the iron tube into a porcelain tube containing a steel bar. In this way the water flowed through a magnetized tube over a steel bar for an hour, but without developing any magnetic condition of the bar. It has been objected to this experiment, that it was not a fair one, because the water contained no iron, while these mineral waters all contain a small amount of soluble carbonate of iron, which may have some influence in producing a magnetic state which my experiment failed to take into the account. To remove this objection I repeated the experiment, using instead of lime water a solution of Sulphate of iron, containing four ounces of sulphate to a gallon of water. Instead of applying a single horse-shoe magnet I used a combination of horse-shoe magnets, known as a magnetic battery. So strongly was the iron bar magnetized that on sifting iron filings over this, the particles arranged themselves over the surface, standing out from it like stiff bristles. Yet on passing the solution of sulphate of iron through a tube thus magnetized, and then over a steel bar in a glass tube for an hour, no development of magnetism in the steel bar could be detected.

To make this proof still stronger I caused a stream of water to flow through a magnetic helix, and then to flow over a steel bar as before. The magnetic helix has a power a hundred fold stronger than a simple magnet, so great indeed that an iron bar held near the cavity will leap into it with surprising force and remain suspended in the air by the magnetic

force of the helix. If it is possible for water to receive and convey magnetic influence, water flowing through such a helix, and having a force probably five hundred times stronger than the earth's magnetism, ought certainly to impart magnetism to a steel bar placed in its current, and magnetism of such intensity as to make itself manifest to the usual tests. But no such results followed. The steel bar placed in a stream of water flowing through a glass tube placed in such a magnetic helix, and kept for half an hour in this stream, showed no development of any magnetic condition."

Dr. Kedzie comes to the conclusion, therefore, that water is not susceptible of magnetism, and cannot convey it.

An experiment of my own seems more satisfactory on this point. I took a battery of sixty smee cells and connected one pole to the nozzle of a metallic tube, having a bore of about $\frac{1}{12}$ inch, by wrapping the wire on it for two inches, which was nearly its whole length. To one end of this metal tube I fixed an india-rubber tube having $\frac{1}{4}$ inch diameter, and caused a stream of water to flow through it, with the full force of the St. Louis well. The other pole of the battery was held in my hand. On bringing the stream of water to within two inches of the lips and tongue, the metallic taste of the electric current was quite perceptible; on moving the stream so as to let it strike the eyebrow, the flash was distinct on opening and closing the circuit, and when the stream of water was allowed to fall on the hand holding the other pole, the stinging was very decided. I tried this experiment on several other persons with a like result.

The metallic tube in this experiment became a helix. And certainly in this case, there was no way by which all the phenomena usually manifested to the senses, on the closing and opening of the circuit could be produced, except that formed by the stream of water.

This same experiment was tried by using water from Pine river, forced through the metallic tube by a large Davidson syringe, with a similar result, only the effect seemed perceptibly weaker. There is no doubt, then, but that ordinary water

can be magnetized, and the usual phenomena of such a condition are increased in intensity by the addition of saline and alkaline ingredients.

Prof. Charles P. Williams, Director of the School of Mines of Missouri, says :* “ From the analysis of these waters we certainly have no key to the causes of this interesting peculiarity, though we may suspect it to be ascribable to electrical action, itself the result of chemical decomposition of the saline constituents of the water.”

At present, the line of experiment leans to the side holding the view of the presence of Magnetic qualities, in at least some of these waters. What future research will determine, it is hardly possible to conjecture.

MAGNETIC AND MINERAL SPRINGS.

SEC. 3. RUNNERS FOR SOME OF THEM.

Although several thousand persons visited Michigan for the benefit of her springs during '70 and '71, yet the supply of springs was greatly in excess of the demand, and thereby a lively competition was brought about. In order to keep a decent number of persons at some of these places, disreputable practices were resorted to by the proprietors ; among these is one still in vogue of sending out “ Runners,” or men hired to travel on the different lines of Rail Road entering the state, and by any sort and all sorts of representations induce invalids to visit the particular springs the runner travels for. They are a plausible, smooth tongued set of fellows, with very few scruples of conscience so they get the unsuspecting into their confidence.

Each one has a long list of wonderful cures to tell about ; one or more of these cures were of persons “ afflicted” just as the invalid is to whom he is talking. He tells of splendid accommodations, elegant society, and that he has some friends there who are rapidly improving. The invalid is made, if possible, to think that he has run across a disinterested philan-

* American Exchange and Review, 1871.

thropist, instead of a man hired to repeat his story day after day, and to inquire feelingly into every sick person's condition.

Last summer, a lady who was traveling with her husband for his health told me, that she had scarcely gotten into Southern Michigan before a very kind spoken and apparently sincere man, of middle age, noticing the comparative helplessness of her husband, expressed, after some inquiry, much feeling and sympathy for him and then told his story, which was sufficient to induce them to change their course and plans, and to visit the springs which this person lauded so highly. She remained there only a day or two however, and then started again to carry out her original plan of visiting another spring, when she was again captured by one of these scoundrels and persuaded to go in another direction, she not suspecting but that both men were perfectly honest and disinterested. She did not like the second place, however, and again set out on her original journey.

Her husband was affected with softening of the brain and his physicians had said that he was incurable, but recommended travel. But the third runner she was destined to meet told her that he knew of several cases of that disease that had been cured that season at a certain spring, and he advised her by all means to go there. She thanked him but said she had concluded not to turn off any more from her journey, but if the spring he spoke of would cure such cases she would advise him to go there at once, whereupon the runner retired. The fact is, no spring that resorts to such disreputable practices is worthy of patronage, and should not receive it. If the medicinal qualities of its waters and the reputation it gains in an honorable way will not keep the spring up, it ought to fall, and will fall sooner or later. Then beware of runners and the springs that send them out.

SEC. 4. QUACKS IN MICHIGAN.

The development of the Mineral Springs of Michigan into suitable resorts for invalids, has drawn thence an almost innumerable army of Quacks, Charlatans, and the basest pretenders that ever cursed any spot of earth.

Men, and women too, not only of the deepest moral turpitude, but most generally of the grossest ignorance of the human system, either in its normal condition or in disease, by means of long and flaming advertisements and "cappers" and "runners"—other men and women as base as the pretender—succeed in filching the pockets of hundreds of unsuspecting and unsophisticated invalids who visit the State.

Here Quackery and Charlatanism take every possible shape. Men with the old boot of Jounod proclaim themselves as the apostles of some new depurative process by which the "circulation of the Vital Forces are restored, and the vicious fluids of the human body are removed."

Women with their little humming, magnetic batteries, proclaim themselves as "Great Electro-Magnetic Physicians," while they are as ignorant of the principles involved in any word of their entitular as they are of the geology of the remotest star in space. Others of these women by looking at these stars, stars away out beyond telescopic range, can diagnose with a nicety that puts DaCosta to blush.

Men prescribe for diseased invalids, who boast that all the knowledge they possess of medicine or the physical organization of man, they derived from a miserable, filthy Indian Squaw! I have known a man bring his wife a thousand miles for the benefit of Mineral Waters, and then subject her to the treatment of one of these "Learned Physicians." Some of these robbers, base their pretensions upon being born in the dark of the moon, with a club-foot; they are "natural-born Doctors," and tell organic disease in any portion of the body, by smelling the urine of the patient!

There is another class of pretenders who, perhaps, possess some elementary medical education; who hail from some Royal College, and are always late of the "Royal Hospital of London."

They are utterly shameless, irresponsible, wandering, street-howling vagabonds, without a home, a country, or God. They give free lectures at street corners, free consultations, "no cure no pay," and charge forty prices for some worthless medicine, by which means they eke out a miserable existence.

Last summer, one of these scoundrels added to his business, that of selling diplomas from the Edinburgh University, of which he was a *professor*. For a reasonable compensation he could furnish your name with M. D., A. M., D. D., or LL. D., or all of them. Upon strict examination, it also turned out that "Edinburgh University" was located in the fourth story of a house on Clark Street in the city of Chicago !

These Quacks drive their nefarious business by means of cappers in about this way : The Quack goes to a Spring where there are from 50 to 500 invalids, takes a room, and has his two emissaries,—who pretend to be unacquainted with each other, and with the Quack,—to visit amongst the invalids and, in a casual conversation, to find out the leading symptoms and disease, if possible, of some one. The invalid is assured by the capper that he knows of several persons who have been cured of the same disease by this great Doctor, and persuades the invalid to call on him, that it will cost nothing. If this does not succeed, in a day or two the other capper tries him, in the meantime the invalid's name and symptoms have been handed to the Quack, so that if the invalid does call, he is told at once what his complaint is. The patient is pleased, and a heavy fee is extorted. Some of the most successful cappers are women, of good dress and manners, who operate mostly among their own sex.

One thing is certain, the Spring companies and the proprietors of hotels where visitors are entertained should protect their guests from the ravages of these ignorant, mercenary hordes, by exposing their schemes and quackery, and by putting their sick visitors upon their guard. I believe many of the proprietors of hotels and springs do so, but not all of them. I know one instance certainly where an attendant, a sham-pooper, was discharged from one spring for his grasping avariciousness and mendacity, and he went to another, farther down the State, dubbed himself doctor and took many of the invalids of that spring under his Medical (!) charge as well as his mechanical, and I have heard that women actually submitted to the manipulations of this brazen ignoramus, under his representations of his superior magnetic qualities.

The last time I heard of this man he was giving, for fees, advice to invalids regarding the right use of mineral spring waters, a subject of which he is as ignorant as Balaam's Ass was of quadratic equations, and the proprietors of the place that keeps him must know it ; at any rate it is their duty to inform themselves of the character and ability of men whom they place in such important positions.

Frequently these cappers imitate or feign diseases, and visit among the visitors and sick, eliciting sympathy ; capper No. 2 takes this opportunity to tell what wonderful cures he has known Dr. so and so to make, the malingerer goes to see him with some others who are doubtful of his skill, the capper is cured, of course, and the quack has a big run of custom for awhile, but generally winds up by running away himself.

CHAPTER V.

WATER AS A MEDICINE.

ITS ANCIENT USE.

Water as a remedial agent for the relief of the maladies of the human race appears on the first page of historical medicines. In all ages, in all countries, by all people, water has ever been held in the highest repute as a medicine. Hippocrates made it a subject of study and observation, and his writings upon it are still extant.

Galen devoted much time to a personal examination into its merits. Following these, we find such illustrious names in the medical profession as Boerhave, Hoffman, Haller, Baynard, Floyer, Cheynes, Macquart, Lanzani, Geoffrey, Pomme, and DeHahn, down to James Johnson, James Currie, and John Bell of our day ; all eminent writers on the hygienic and therapeutic use of water. It comes to us, therefore, with the authority of centuries of experience. Pointed out by nature at the dawn of man's existence as a remedy, it has stood the ordeal test in all the innumerable phases of his life, and has become the most universal in its application of all the agents for the preservation of health and cure of disease.

Nor is this to be wondered at when we reflect that four-fifths of all the tissues composing the body are water. Indeed the same proportion holds good in regard to the various articles that compose the diet and drink of man. Digestion cannot be carried on without a large proportion of water, the food taken could not be reduced to chyme nor the chyme furnish chyle, nor the chyle produce blood. The blood could not flow to the various organs and there deposit their appportionate material.

Water is the only liquid which is absolutely required for
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the growth, sustenance, and perfection of man, physically. Water is required for the removal of effete and deleterious matters from the system. Water is the quickest and most complete source of muscular power. The porters of the Andes, the most powerful and enduring in the world, habitually drink quite warm water on their journeys ; they do it to gain strength. Alexander Selkirk, the genuine Robinson Crusoe, who spent four years alone, on the island of Juan Fernandez, eating nothing but goat's meat and drinking nothing but water, asserted that he was twice as strong as he ever was in his life.

MODERN VIEWS.

Drs. Bidder and Schmidt inform us that water increases the flow of the bile in its solid as well as fluid contents.

A dog was taken weighing 5 kilogrammes and fed on the following articles with the following results :

GRAMMES	GRAMMES OF BILE	OF SOLID MATTER IN IT.	
185 Beef	2.283	with	0.135
25 " 158 water with it	4.030		0.117
185 water alone	5.165		0.143

This was verified in three other experiments.

Water is an augment to the quantity and power of the gastric juice, and warm water is a direct and powerful renewer of the secretions of the stomach.

Standing, therefore, in the midst of a progressive physiology and an enlightened practice, can we wonder, as Dr. T. K. Chambers says, "that such a powerful agent has been set upon a pedestal to be worshiped as a panacea for all human ills?" whilst I reject such pretensions, I recognize in water a powerful agent, one of the many placed here by Providence for the benefit of our race. Being thus powerful, we should guard every avenue to the improper use of it. The abuse of it, like the abuse of any of the great blessings of Providence, redounds to our injury.

If this be true of water in common, it applies with much more force to the waters from those rare fountains containing intricately compounded medicines from the great laboratories of nature—water containing all those chemical ingredients of the tissues, organs, and fluids of the human body, and of the material which constitutes his aliment.

CHAPTER VI.

THE PROPER USE OF MINERAL WATERS.

NECESSITY OF CARE.

To receive from Mineral Waters, either as a drink or as a bath, their full remedial effects, requires, on the part of invalids or their advisers, a thorough knowledge of the water to be used ; not only the chemical formula, but the action and value of each ingredient, and of the combination with each other and all other ingredients on the various organs of the human system, but also a knowledge of the diseases to be treated. To know how to distinguish between them, to know the various causes that produce the same disease, to know how far each particular disease has progressed, to know the value of symptoms, whether they indicate organic and permanent disease, or functional and temporary disorder, thorough acquaintance with the performance of each organ of the body in health is necessary, in order to point out clearly how much disease has affected them ; and the application of the remedy in question requires a nicety and skill that can be attained only by this knowledge and experience in the use of the water. The person who, without sound information regarding any tissue or organ of the economy in health or disease, attempts to counsel others in regard to the use of such remedies, assumes a responsibility which, to educated minds, is simply appalling, and of which the pretended counselor is grossly ignorant or he would not assume it.

This subject has been considered of such vital importance in Europe, that at many of the Mineral Springs mostly resorted to, governments have appointed physicians to reside permanently, and give such advice as may be necessary to the safe and speedy recovery of the sick. The proprietors of the most

popular springs in this country have found it necessary to make similar appointments.

MEDICAL ADVISERS.

“ The Medical Adviser at all our popular watering places has, necessarily, very delicate and responsible duties devolved upon him. To some extent he must be the recipient, in a professional point of view, of the confidence of the invalid stranger who has left a distant home to seek at medicinal fountains the best remedy for the maladies of which he hopes to be relieved. This confidence, while it is agreeable to the honorable mind is not without onerous responsibility.

A sufficient knowledge of various mineral springs to enable the medical adviser to judge correctly of their specific character and adaptations, unfolds at once to him a wide field for the exercise of skill and judgment, in selecting for his patient the one best adapted to the nature and wants of his case.

All the fountains of healing, with their varied modified influences, (for each one differs in some essential particulars from all the others,) should be regarded as so many different articles in nature's *materia medica* ; each possessing adaptations somewhat peculiar to itself, for the different diseases or states of the system. Here, then, is a wide range for the medical adviser, and his tact and success in advising most wisely will necessarily depend upon his acquaintance with the peculiar qualities and specific effects of all these different agents.

Again, such an adviser, to be most useful to his patients, must be careful not to be influenced by his *loco personæ*, or to regard the particular fountain over whose medical direction he presides as a *Catholicon*, and adapted better than any other to all sorts and conditions of cases. A medical adviser, at a mineral fountain, could not well fall into a greater error, or more clearly evince a want of wise discrimination, than in finding his remedy, in all cases, in the particular agent which he immediately directs ; for, in the nature of things, such universal preference would often be misplaced. Standing in

the delicate relation which such an adviser holds to the invalid public, he must regard the various mineral agencies around him somewhat in the same light in which he regards the various medicines of the apothecary's shop, and should wisely and freely choose among them for the use and benefit of his patients. Any other course would be empirical, hazardous to the best interests of the unfortunate invalid, and utterly unworthy of his confidence." *Mineral Springs of Virginia.*

THE PENALTY.

If all waters were similar in their effects upon all diseases, their action would be so exceedingly simplified that there would not be much danger of their improper use. But the very reverse of this is the case. Mineral waters differ very essentially in their chemical composition. They affect different diseases diversely, and the same water produces *diametrically opposite* effects in the same disease, depending entirely on the quantity of water given, the time, the temperature of the water, either as a drink or a bath, the length of time spent in the bath, and many other considerations. In fact, very few persons are affected exactly alike by mineral waters.

A number of persons who were at St. Louis springs last summer, will remember a man by the name of Squires, a pale, emaciated dyspeptic, who came to the bath-house for the first time one beautiful morning in July; he sat down by one of the fountains, and, at somebody's advice "who was 'held' just like him and was cured," he drank two large glasses of water as it poured from the fountain at 50° temperature. He was soon carried into the Physician's office with severe gastric pains, an attenuated flickering pulse, cold skin, pallid, sunken countenance, and other evidences of intense prostration; he rallied sufficiently to be moved to his boarding house, but he never recovered from the effect of tilting nearly a pint of quite cold water into an anæmic, depraved and wornout stomach.

Now, the feature of Ac. Alkaline water, which is most universally observed by persons, is, that they can drink a pint of it without feeling the least inconvenience.

Prof. Moorman, resident Physician of White Sulphur Springs, Virginia, mentions a case where quite serious results came near following a patient who drank twelve glasses of water in one day, instead of *six* as he was directed.

THE BATH.

I am informed by Physicians at springs where there are bathing facilities, that they are frequently called to rescue persons from the effect of some foolish experiment on themselves, with various kinds of baths, which they knew nothing about. Persons of old age, or weak nerves, tender constitution, or cold, phlegmatic temperaments, anemia, debility of gastric mucous membrane, flatulence, nausea, or diarrhœa, should commence the use of cold water, in any shape, very guardedly.

On the other hand, large plethoric persons, and others with a tendency to cranial or other congestions, to hemorrhages, or who have affections of the heart, and those diseases where stimulation is injurious, should avoid the hot bath. A large number of cases are published in various works, of serious and sometimes fatal injury from recklessness in the use of hot baths. No one unaccustomed to hot baths has any business in one, except under medical advice.

I have several times known hot baths to produce serious vertigo and palpitation of the heart, and in one instance a latent epilepsy was developed in a self-willed young man by the same means.

I have never met with any case that required two full baths a day, and I have known several invalids who were in a hurry to get well, get worse by the trial of them.

Dr. Hanbury Smith, who of late years has paid more attention to the subject of mineral waters than most any one in this country, in one of his papers makes the following very sensible suggestions :

GENERAL RULES.

The best time of the year to use mineral waters must be

decided by circumstances. The height of a hot summer or the depth of a cold winter are certainly *not* the best times. The portion of the year during which the patients can most enjoy moderate exercise in the open air is unquestionably the most proper time during which to carry out an effective course of treatment. But in a less active way mineral waters may be most advantageously employed in all seasons.

The best time of the day for drinking is the morning, the earlier the better. In the morning the body is refreshed by rest, the mind tranquil, the stomach empty, and the quantity of fluid in the system being diminished, the water is more easily tolerated, digested and absorbed. At least a quarter of an hour should elapse between each glass, and from twenty minutes to half an hour or more between the last glass and breakfast.

The waters may be taken on an empty stomach at any other period of the day half an hour before the latest meal, or before going to bed.

When requisite to relieve acidity of stomach, an alkaline water may be taken so soon after meals as the acidity is remarked; and in some cases where iron waters taken on an empty stomach produce headache, they do not do so if taken with or immediately after a meal.

Mineral waters should not be taken *too cold*. Though less agreeable, they are vastly more efficacious in the majority of cases when warm or tepid. At most cold springs in Europe, means are taken to raise the temperature to the degree which experience has shown to be the best for each class of cases. This is generally effected by the addition of some of the natural water kept hot for the purpose, warm milk or whey.

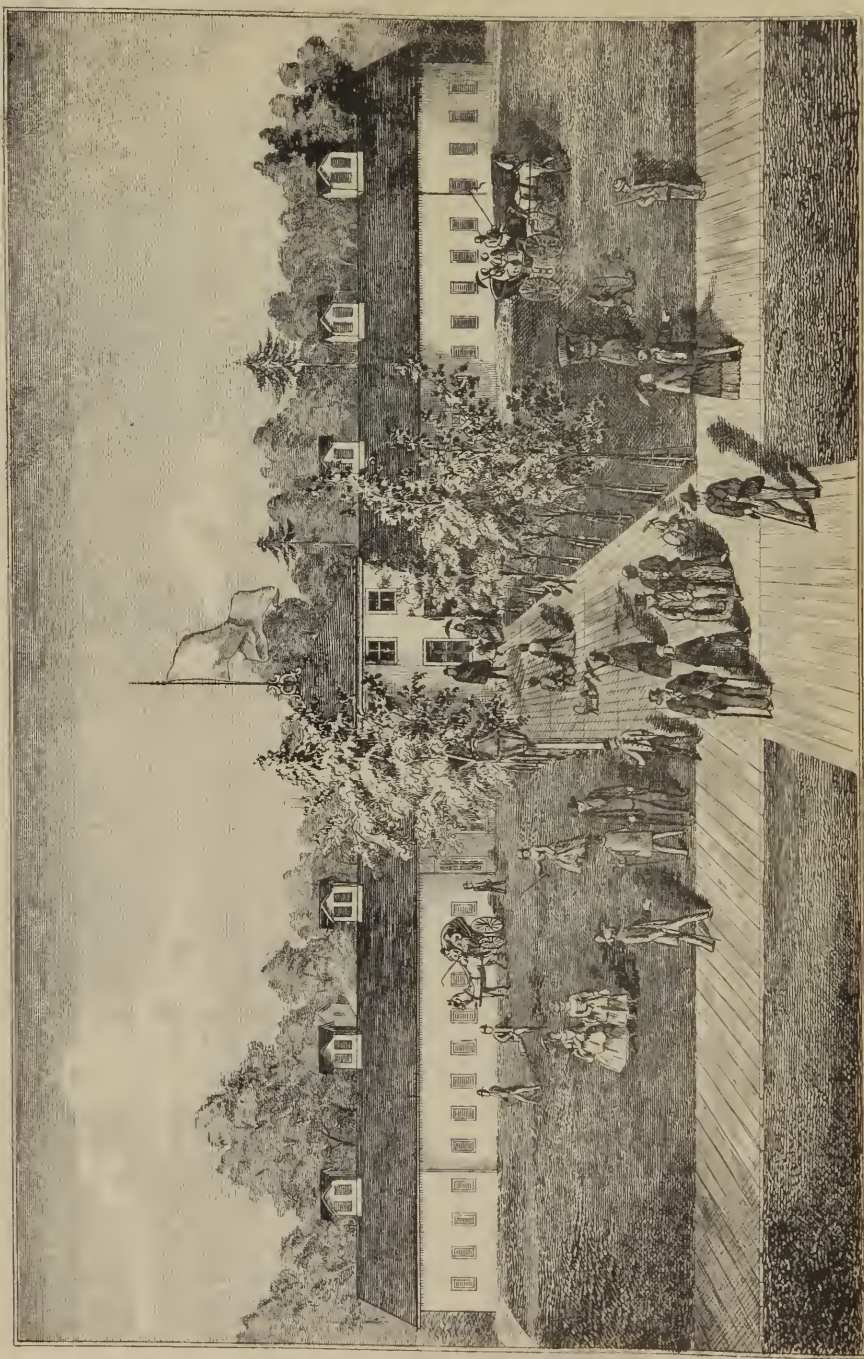
All persons using mineral waters should dress warmly.

The diet should be simple and easy of digestion. The appetite is generally stimulated by the use of the waters, but should be restrained within moderate bounds. In more serious cases, requiring a regular course of treatment, salt and smoked articles of diet must be avoided. Where there is great tendency to obesity, farinaceous food like rice and pota-

toes should be very sparingly indulged in. In these cases, and in all where the digestive organs are implicated, much gentle exercise in the open air should be indulged in.

May, June, September and October, will be the months when the most improvement may be expected in such cases, while complaints, for the cure of which an abundant excretive action of the skin is desirable, such as chronic rheumatism, gout, catarrh of the respiratory mucous membrane, &c., are more amenable to treatment during the hotter summer months. During the winter months Russian and Turkish baths are powerful adjuvants to the mineral waters, particularly in obstinate rheumatic cases, sciatica, neuralgia, and catarrh. At most of the German Springs, all sorts of additions are made to the natural waters. To mix one-third or one-half of warm milk or whey is much in vogue, especially in cases of pulmonary disorder. A quantity of the natural water is also kept hot to mix with that fresh drawn from the spring, for the purpose of raising its temperature, when this is too low for the particular case. Of course the water is generally much changed in composition by this process of heating. The waters of different springs are thus mixed, and the salt prepared by evaporating the waters consisting only of sulphate and carbonate of soda, is added by the teaspoonful, not only at Carlsbad but at other Spas also. This system of adding and mixing may, of course, be abused, and interferes with exact observations on the effects of the water pure and simple. A pure chalybeate may be added to any other water deficient in iron. Finally, some waters proving at first a little too strong to agree well with the stomach, may very properly be diluted with simple carbonic acid or even common drinking water.

The glasses or beakers used in Europe are much smaller than our half-pint tumblers, one of the latter being the common, two being ordinarily an ample dose in almost any case. Experience and professional advice must govern the employment of larger quantities.



BATH-HOUSE, ST. LOUIS SPRINGS 180 Feet Long.

CHAPTER VII.

ST. LOUIS MAGNETIC SPRINGS.

ST. LOUIS.

This is a quiet, very pleasant little town of 1200 inhabitants, situated on the south side of the Pine River, in Gratiot County, 30 miles west of Saginaw, and the same distance north of St. Johns, a town on the Detroit and Milwaukie Rail Road with which it connects by a daily line of stages.

To Saginaw there is a plank road, and a good set of coaches run daily to and from the springs. Saginaw is reached from the east, via Detroit by the Detroit & Milwaukie Rail Road and Flint & Perre Marquette Rail Road. From the south by Jackson, Lansing and Saginaw Rail Road.

From Chicago by Michigan Central or Michigan Southern, connecting with Jackson, Lansing and Saginaw Rail Road. A rail road is being rapidly built from Saginaw to St. Louis and during this season 1872, it will be completed.

St. Louis has four hotels capable of accommodating about 300 visitors ; while the private boarding-houses, some of them are very good, can accommodate as many more.

The town boasts of a well-organized fire department—a very good thing to have in Michigan,—3 or 4 Religious societies, as many Lodges of secret organizations, a public library, the finest bath-house in the United States, billiard rooms, chess rooms and ten pin alleys. St. Louis is a new town, having been hewn out of the forest, mainly within the magnetic period, and if her people have no ancient and stately mansions, they certainly have comfortable homes, and real western hospitality.

CHEMICAL ANALYSIS.

The following analysis of this water was made by Dr. Samuel P. Duffield, of Detroit Medical College, in the fall of 1869, at the time the electrical condition of the water was being so generally discussed.

It is calculated on the imperial or wine gallon S. G. 1011.

Sulphate Lime.....	66.50
Silicate Lime.....	6.72
Chloride, a trace.....	
Bi-carbonate Soda.....	106.40
" Lime.....	69.40
" Magnesia.....	17.50
" Iron.....	1.20
Silica, Free.....	2.88
Organic matter and loss.....	2.00
<hr/>	
Total constituents.....	272.60
<hr/>	
Bi-carbonates.....	194.50
Free Carbonic Acid in gallon.....	6.21
Sulphureted Hydrogen, traces.....	
Total Mineral matter in gallon.....	276.81

In its chemical combinations this spring belongs to that valuable class known as Acidulo Alkaline, resembling somewhat the celebrated Vichy water, and Selters Altwasser and Saltstraunen Reincez of Germany. "Looking at its chemical composition," says Prof. Duffield, "its percentage of the bi-carbonate of soda, magnesia, and lime, will make it valuable in Kidney difficulty, and in those diseases which require treatment with alkaline carbonates such as rheumatism in its chronic forms;" he "regards it as being valuable chiefly in Kidney disorders, especially those of the uric acid diathesis." Its electrical qualities, he thinks, "will be found in the hands of the observing practitioner, of value in paralytic cases."

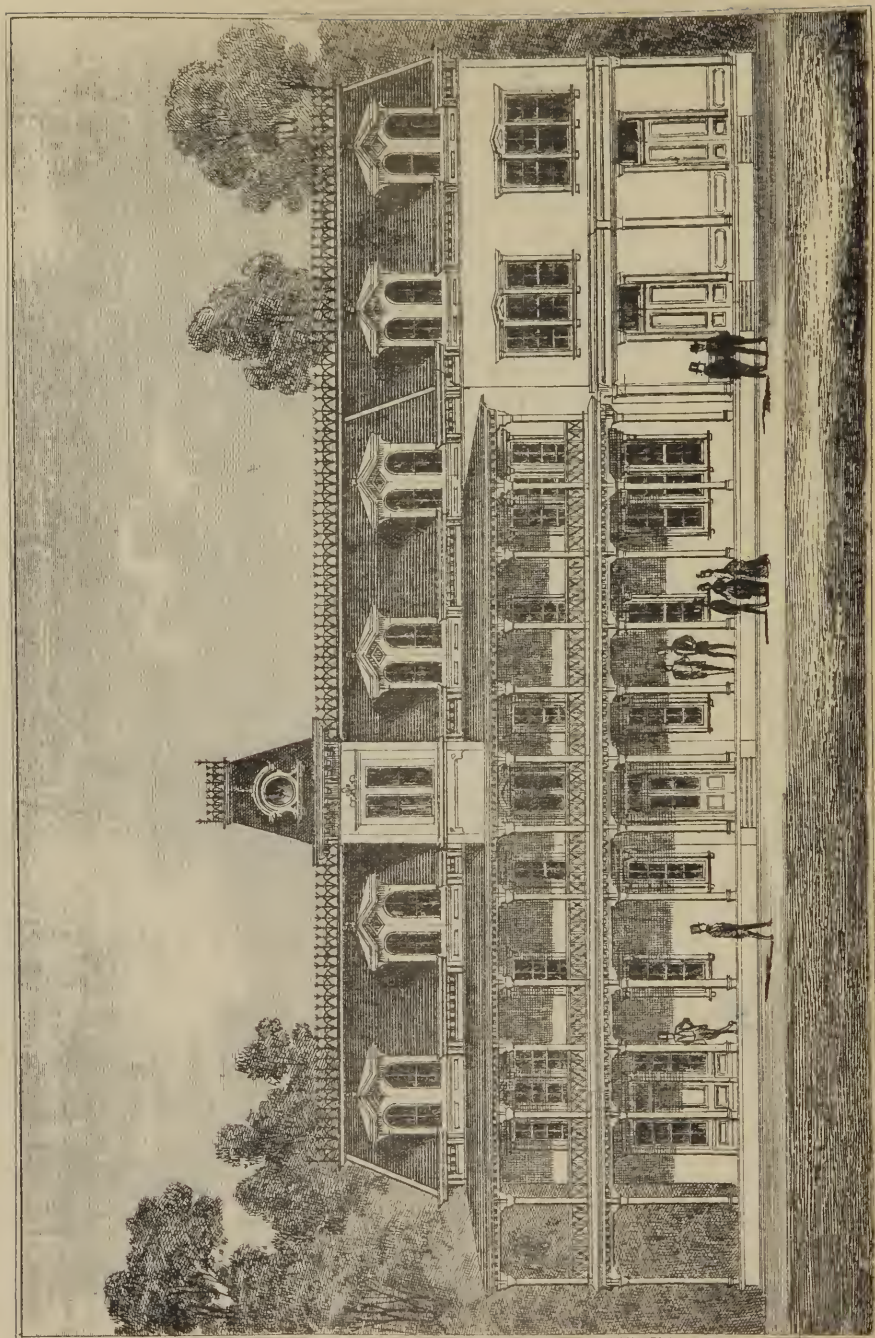
The sample, of which the above is the analysis, had been standing in a tin can for some three or four weeks previous to the investigation, and it is probable that some of the consti-

tuents had deposited. Particularly may this be true of the iron, which would be rapidly converted into hydrated ferric oxide, and hence give a much lower content of the chalybeate constituent than usually obtains in the freshly-collected sample. That the water is rich in iron-salts is made evident by the fact that hydrated peroxide is rapidly deposited on articles immersed in it, and the author has in his possession a small wine-glass which had been used for a short time in drinking the waters, and which is completely enfilmed with a coating that, on a qualitative analysis, proves to be mainly ferric oxide with traces of carbonates of lime and magnesia. This film of deposited matter is so closely united with the surfaces, both exterior and interior of the glass, that severe rubbing and washing will not remove it. The glass still preserves its transparency, and transmits a yellowish light which, though somewhat darker, still closely resembles that which has had passage through a glass deeply colored by uranium oxide. The coating dissolves readily in warm hydrochloric acid, the solution showing the ingredients we have named above. The demand for this colored glass by visitors has become so great that two rooms have been arranged especially for coloring it. A series of troughs, with perforated bottoms, are fixed above one another. Above the top one a continual shower of water is falling, which passes from one trough to another, and thus colors dozens of pieces at once. The waters of Eaton Rapids, Midland and some other places, also color glass.

The importance of iron, medicinally, is so well established, and so generally known, that it is useless to mention the numerous diseases for which it is daily administered.

Sulphureted hydrogen gas imparts considerable stimulation to the effects of mineral waters taken internally ; while the carbonic acid, by its stimulation, gives a peculiarly exhilarating effect to baths. Persons in the habit of bathing in mineral waters, can tell immediately the presence or absence of this important ingredient. The presence of it imparts a light, airy, pleasurable feeling, which the recipient is sure to mention in rather enthusiastic terms. Taken internally this water is tonic, diuretic and aperient.





NEW HOTEL, ALPENA SPRINGS.

CHAPTER VIII.

ALPENA MAGNETIC WELL.

LOCATION. ANALYSIS.

This well is situated in the town from which it takes its name, a thriving shore-town of Thunder Bay, about a hundred miles south of Mackinaw. Alpena is the center of the fish trade of Lake Huron, and being situated at the mouth of Thunder Bay River, that stream furnishes pine logs in great abundance for the saw mills of the town, and with what comes down on rafts makes it quite a lumbering point. It has considerable commerce and about 2500 population, and several churches and fine schools. For visitors the accommodations are very good. The place is reached from Saginaw by steamers three times a week, and from Detroit once a week.

The water flows from a depth of 900 feet, coming from below the rock formations.

CHEMICAL ANALYSIS:

	Specific gravity 1,012 In a gallon.
Bicarbonate of Soda.....	15,736
“ Lime	55,136
“ Magnesia.....	62,920
“ Iron	1,840
Sulphate of Lime.....	30,056
Silica and Aluminum.....	3,088
Chloride Sodium (Salt).....	68,256
Organic Matter and Loss.....	928
	<hr/>
	237,960

Total mineral constituents, 237,032 grains. Sulphureted Hydrogen gas, 3.91 cubic inches. Carbonic acid gas, a trace.

This is a good sulphur water, the best in the State probably, and is no doubt serviceable in chronic cutaneous diseases, especially in connection with bathing facilities, which are afforded at the well.

Sulphur baths are an efficient and powerful remedy when properly administered in cases where they are clearly indicated.

The baths treatment should be preceded by a gentle opening of the emunctories, and as there is a considerable *chlor. sodic* element in the water, I should suppose two or three day's course of drinking two or three pints per diem, would place the alimentary canal in a soluble condition, while at the same time the alkaline element would set the kidneys to acting freely. These points being attended to, the baths will prove more salutary.

THERAPEUTIC VALUE.

The spring has a resident physician, and issues a pamphlet, but it gives no account of the physiological or therapeutic action of the water, which to say the least, is an egregious blunder. We are assured, however, that it cures paralysis, rheumatism, dyspepsia, &c. But that this water cures dyspepsia, just because it is dyspepsia, without any *modus operandi* or action that can be described, I presume few will believe. Besides there are classes of disease in which sulphur waters are fearfully injurious, and the better the prominent quality of the water is, the greater is the injury. Among these diseases are consumption, pulmonary hemorrhages, all forms of cancer and general lowering of the constitution attended with chronic diarrhœa.

All sulphur waters will generally reduce the force and frequency of the pulse. This is not the effect of direct sedative action upon the heart, but from its alterative and deobstruent agency. Hence in certain organic affections of the heart, these sulphur waters are injurious, while in a larger class of sympathetic heart affections arising from visceral engorgement or obstruction, these waters would be eminently useful.

The effects of the Sulphur Water upon the human body resemble mercury in several respects. Not to mention others, its resemblance is strikingly manifest from the fact of its producing salivation under certain peculiar circumstances. Another marked similarity may be mentioned, especially as it has a direct bearing upon the proper method of its administration : I allude to the existence of a philogistic diathesis in individuals with whom either remedy is used. When the system resists the specific action of mercury, it is a certain test that the inflammatory diathesis prevails to a considerable extent, and this is the cause of the resistance ; for lessen the inflammatory diathesis by proper evacuations and the specific action of the mercury will be readily induced. The system often offers the same resistance to the successful use of Sulphur Water, which is evidently occasioned by the excess of the inflammatory diathesis, inasmuch as when the inflammatory disposition is abated, the water promptly produces its wonted good effects. (*Mineral Springs of Virginia.*) Of course, these waters, while they produce the same powerful alterative effect as mercury, cannot produce its injurious effects upon the system. The mere fact of water being strongly impregnated with sulphureted gas, is not, of itself, a sufficient evidence that it is a valuable remedial agent.

CHAPTER IX.

MIDLAND MAGNETIC SPRING.

LOCATION. ANALYSIS. THERAPEUTIC PROPERTIES.

This well is in the town of Midland, a thriving village situated on the Tittabawassa River, twenty miles northwest from East Saginaw, to which place it is connected by the Flint and Pere Marquette railway. A very good bath-house is open. An analysis of this water shows it to contain in one imp. gallon :

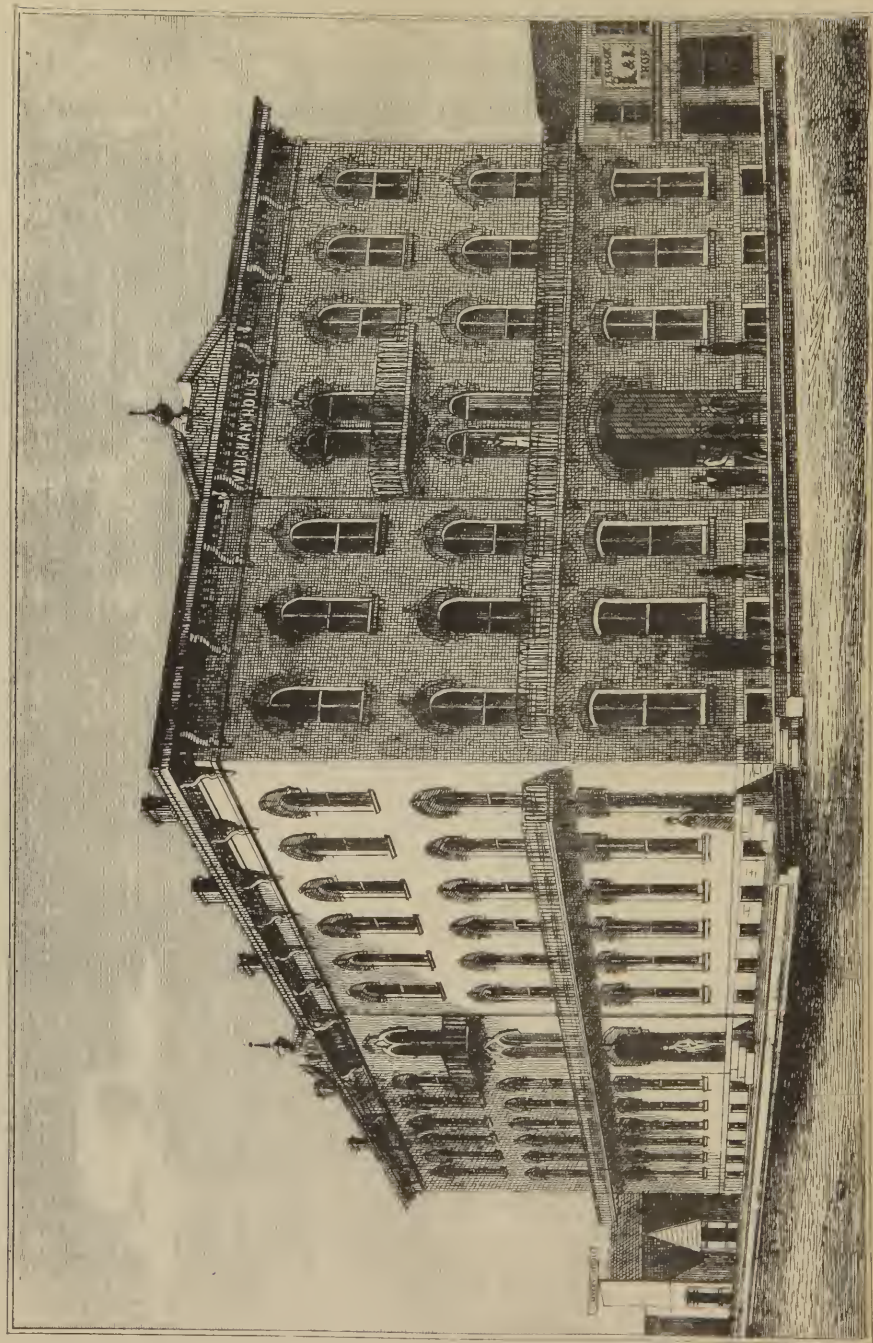
Sulphate of Lime.....	gr. 4,4591
“ Potassa.....	“ 82,1930
“ Soda.....	“ 22,0690
Phosphate Alumina.....	“ 1,7287
Chloride Calcium.....	“ 6,2194
“ Magnesium.....	“ 2,1948
“ Sodium.....	“ 32,7025
Silica.....	“ 2,9631
Organic Matter.....	“ 2,4692
Loss.....	“ 3,2120
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Total Salts.....	160,2108

The principal ingredient in this water is sulphate of potassa, which is a mild aperient : the next largest ingredient is chloride of sodium or common salt ; also an aperient. The next largest qualitative element is sulphate of soda or glauher salts ; a purgative. This well is therefore classed among the purging saline waters. It is a valuable class of mineral waters, generally safe for popular use, and not contra-indicated by the tubercular diathesis.

As there is an entire absence of carbonic acid gas, it will not do as a rule to bathe in the water at its natural tempera-

ture, 47° F. Prof. Duffield, of Detroit, who analyzed this water, says :

“ These waters will be found beneficial in all cases where there is a lack of secretions in, or exhalation from, the mucous surface of the gastro intestinal canal, thereby establishing healthy secretions, especially in torpid conditions of the alimentary canal; also for the relief of plethora and chronic maladies dependant thereon, producing augmentation of the action of the absorbents, they will, in the hand of the practitioner of Medicine, become of value in some forms of dropsy. By their cathartic action they will have a tendency to relieve intestinal torpor, dependent on inactivity of the muscular fibres of the alimentary canal, and even in a partially paralyzed condition of this organ. In Chorea, Hysteria and analogous maladies, they will prove a valuable aid to the direct medication of the family physician.



VAUGHAN HOUSE, EATON RAPIDS SPRINGS

CHAPTER X.

EATON RAPIDS MAGNETIC SPRINGS.

LOCATION. ANALYSIS OF WATERS.

Eaton Rapids is a very pleasant town of twenty-five hundred inhabitants, situated on Grand River, twenty-five miles Northwest from Jackson. The Grand River Valley Branch of the Michigan Southern Rail Road, supplies the town with several daily trains. Seven Mineral Wells are found here, the deepest being nearly two hundred feet below the surface. Every well, I believe, is connected with a hotel, and each hotel has bathing facilities attached to it, so that invalids are not troubled, as in many places, getting to and from the bath-house. These wells all belong to the *calcic* class of waters. The Frost Well is the oldest and bears the following analysis by Prof. Duffield :

Sulphate of Lime.....	grs.	4.64
Carbonate of Lime.....	"	46.24
“ Magnesia.....	"	9.11
“ Iron.....	"	2.38
Chloride of Sodium.....	"	9.21
Silicia.....	"	15.74
Organic Matter and loss.....	"	90

Total Mineral contents 1 imp. gallon.....	88.22
Total Carbonic Acid.....	22,22 Cub. In.

The analysis of the *Shaw* spring made by Prof. Kedzie of the State Agricultural College at Lansing is as follows :

Cubic inches of Carbonic Acid Gas.....	per gal.	15.97
Solid residue left on evaporating 1 gal.....	grs.	90.45

ANALYSIS OF RESIDUE.

Sulphate of Lime.....	grs.	48.13
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Carbonate of Lime.....	“	20.74
“ Magnesia.....	“	3.84
“ Iron.....	“	2.23
“ Soda.....	“	11.57
“ Potassa.....	“	1.27
Chloride of Sodium.....	“	90
Silicia Acid.....	“	1.40
Organic matter and Loss.....	“	90

ANALYSIS.

Prof. Kedzie also made the following analysis of the *Mosher* spring :

Sulphate of Lime.....	grs.	45.16
Carbonate of Lime.....	“	19.43
“ Magnesia.....	“	4.52
“ Iron.....	“	1.00
“ Potassa.....	“	1.15
“ Soda.....	“	5.38
Chloride Sodium.....	“	90
Silicic Acid.....	“	2.54
Organic matter and Loss.....	“	85
Total solid contents in grains.....	“	79.23
Cubic inches carbonic acid gas.....	“	15.38

Dr. C. T. Jackson State Assayer of Massachusetts made the annexed analysis of the *Sterling* spring :

Sulphate of Lime.....	grs.	55.20
“ Soda.....	“	12.59
“ Magnesia.....	“	9.40
Carbonate of Soda }.....	“	5.21
Chloride of Sodium }.....	“	2.80
Carbonate of Iron.....	“	
Total solid contents.....		85.20

Analysis of *Bordine* spring by Prof. Kedzie :

Sulphate of Lime.....	grs.	57.50
Bi Carbonate of Lime.....	“	40.47
“ “ Magnesia.....	“	8.40
“ “ Potassa.....	“	3.00
“ “ Soda.....	“	5.05
“ “ Iron.....	“	2.25

Chloride of Sodium.....	“	1.50
Silicia.....	“	2.00
Total grains in gallon.....	“	120.17
Cubic inches Carbonic Acid.....	“	17.35

Therefore these Eaton Rapid wells produce natural Lime waters. In three of them, Sulphuric acid holds the lime, *Sulph. Calcic* waters; and in two, Carbonic Acid being in more active proportions, changes the element, *Carb. Calcic* waters.

The proportion of Lime to the other ingredients may be easily presented to the eye by means of this table :

	Lime.	Other solid contents.	Proportion of Lime.
Frost Well	50.88	38.34	4-7
Shaw Well	68.87	21.58	7-9 nearly
Mosher Well	64.59	14.64	over 4-5
Sterling Well	55.20	30.00	5-8 nearly
Bordius Well	97.97	32.20	3-4

As lime exists in such large quantities in these waters, it may not prove uninteresting to refer to the medical history of the official Aqua Calcis, not that there is identity of action but perhaps a similarity.

It is one of the oldest remedies on the catalogue. Hippocrates used it in some skin diseases. Pliny used it to heal ulcers. Vogt declared that when taken internally it diminished the secretions of the glandular organs, and that its habitual use was hurtful to the *primæ viæ*.

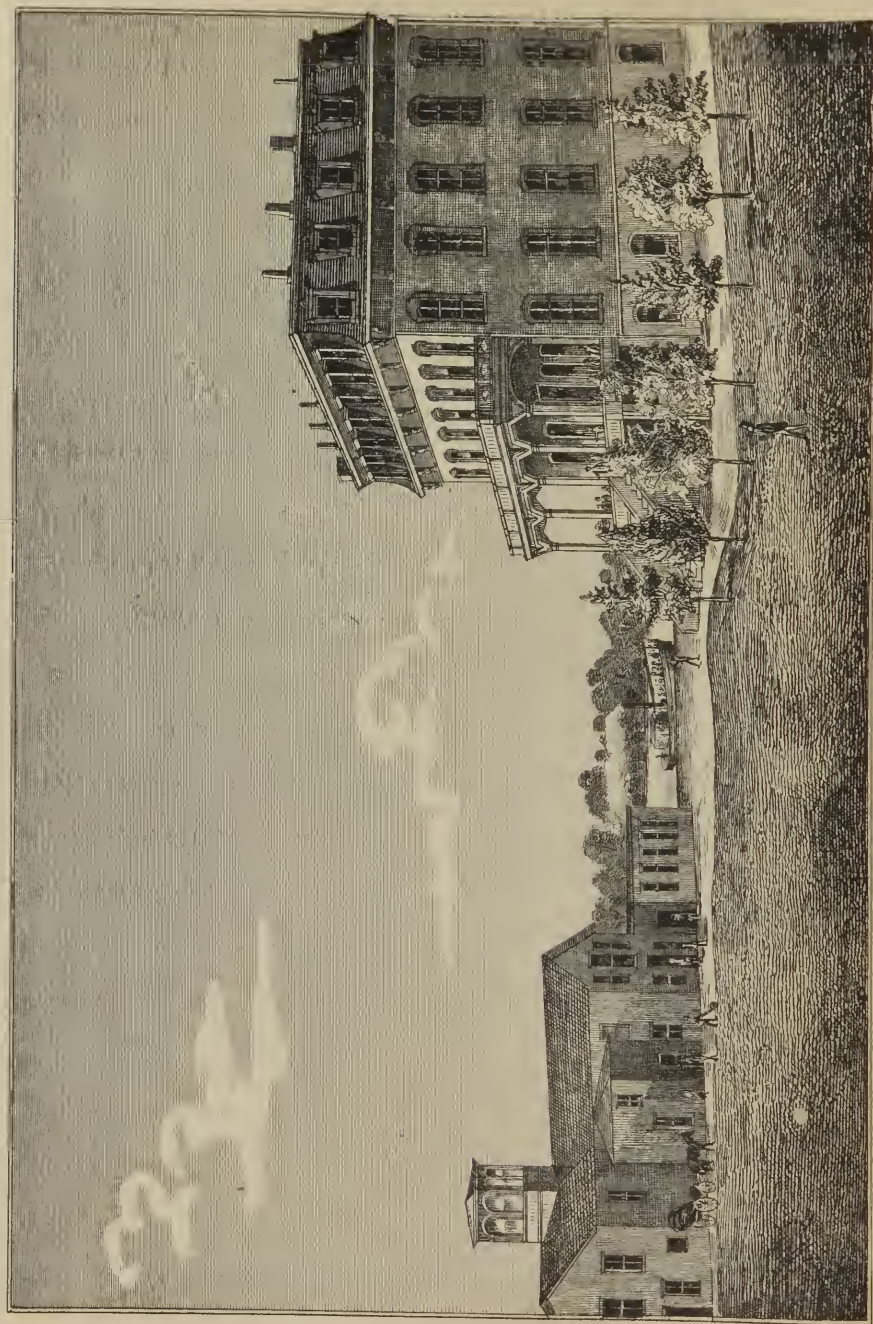
A number of the German school attribute to it a solvent action like that of iodine upon enlarged glands. Vogt also attributed to it a sedative influence upon the nervous system. Curative effects have been ascribed to it in *chronic bronchitis* with profuse expectoration, but the daily habit should be kept regular. It is alleged as being suitable in certain forms of chronic diarrhœa, when there is no ulceration, pain or fever. In *tympanites* and flatulent colic arising from habitual acidity it has been recommended.

About 1740 lime water superceded the celebrated Joanna Stephens “lithontriptic,” and the writings of Gadshell, Blane and Whytt attest the benefits of its use in calculus. Whytt

proved that its reputation was due to its local astringent effect on the bladder, thus allaying inflammatory action and blunting the sensibility of that organ. Blane ascribes to it an additional effect of neutralizing the free acid of the urine and thus prevents the growth of calculus. Urate of lime is said to be more soluble than urate of ammonia or uric acid, (Christison,) but the reverse of this is also stated. (Thudicum.)

Some state that its use should be confined to chronic forms. Lime water has been recommended in purulent discharges from the urinary passages. Kissil advises it in *diabetes insipidus*, Whytt in chronic gout, and Clarus in Rachitis and osteomalacia.

These are only a few of the diseases in which the officinal preparation has been used, and for centuries its reputation has been going up and down like a child's see-saw, probably it was incapable of performing all that was promised in its name. (*Stille's Therapeutics*.) If so much difficulty presents itself in fixing the proper place on the therapeutic scale for a well-known officinal medicated water that difficulty must be greatly increased in estimating the medicinal value of waters so complicated as those here presented. Perhaps this obvious difficulty was one reason that prevented the physicians and chemists who analyzed the waters from recommending them as medicinal agents, the only exception being in favor of the Sterling spring by Dr. Jackson of Boston. My own opinion is favorable toward these waters as remedial agents. Here is an interesting and profitable field of professional investigation which should be developed as rapidly as circumstances will allow.



HOTEL AND BATH-HOUSE AT SPRING LAKE.

CHAPTER XI.

SPRING LAKE MAGNETIC SPRING.

The village of Spring Lake is situated on the point of land formed by the junction of Grand River and a beautiful body of water, one of the numerous little Lakes already mentioned known as Spring Lake. This lake is five miles long, half a mile wide ; about one hundred miles north of Chicago, and directly opposite Milwaukie. It is two miles from the town of Grand Haven with which it is connected by stages daily, and steamers frequently stop at the village. A very good bath-house is in operation, but as the well has no flow, the water has to be pumped up for all purposes. It was analyzed by Prof. Wheeler of Chicago with the following result :

Temperature, 52° F.		Specific Gravity, 1.00640	
		<i>Grains per gallon.</i>	
Bicarbonates. Chlorides.	Potassium.....	4	2880
	Sodium.....	405	5330
	Calcium.....	113	4200
	Magnesium.....	36	2000
	Soda.....	0	0547
	Lime.....	0	1308
	Ferri.....	1	0090
	Magnesium.....	0	0040
	Manganese.....	0	0534
	Bromide.....	2	1700
Sulphate of Soda.....		46	7000
Silicia.....		0	5030
Alumina.....		traces	
Ammonia.....		0	0158
Organic Matter.....		18	2902
Lithia.....		traces	
Total Mineral contents.....		628	3719

Spring Lake Well belongs to the class of salt brine, common salt, or *Chlor. Sodid* waters, and is one of the best in the

State. It is the second strongest in the State of this class of waters ; that is, it contains the second largest proportion of its principal element. It contains Bromine, as all strong salt waters do, and a trace of Lithia and also of Alumina, but these ingredients are in too small a quantity to be of any decided benefit to the water.

The Spring is visited principally by persons from Chicago, to whose enterprise the place owes its prosperity.

CHAPTER XII.

LANSING MAGNETIC SPRING.

LOCATION, ANALYSIS, &c.

Lansing, the capital of the State, is a very pretty and flourishing young city of 6,000 inhabitants, situated at the confluence of Cedar and Grand Rivers. The Reform School of the State is located here, and two Colleges issue their diplomas from this place. Lansing is easily reached from any direction by rail road, and the Mineral well is the best of the *Chlor. Sodici* group in the State. It is situated about a mile up the river, and a small steamer is constantly running to and from it. The well is fourteen hundred feet deep, and has a flow of fifteen hundred gallons per day, with a temperature constant at $53\frac{1}{2}^{\circ}$ F.

The following analysis was made by Dr. Jennings, of Detroit, Sp. Gr. 1.0042.

Chloride of Sodium.....	320.224
Bi-Carb. Lime.....	107.590
“ “ Soda.....	112,081
“ “ Magnesia.....	23.027
“ “ Iron	1.882
Sulphate of Potassa.....	14.940
“ “ Soda.....	30.065
Silica	3.966
<hr/>	
Solid contents 1 imp. gal.....	613.775
Total Carbonic Acid.....	235.550 cub. in.

It will be observed, that more than half of the entire solid contents of this water is common salt, placing it in the class known as salt brine, or *Chlor. Sodici* waters. As is always the case with these waters, they hold in combination a large number of other elements, making them a valuable class of waters adapted to numerous therapeutic purposes.

THERAPEUTIC QUALITIES.

These waters are tonic and stimulant with a disposition to pass off by the bowels when taken in large quantities. In more moderate doses the skin and kidneys gain increased activity. Of course if this is pushed too far they become depleting, but their moderate use will strengthen and tone up rapidly and permanently broken down systems; especially those due to impaired visceral derangements. One point however should be borne in mind always: that the whole group of saline waters have a constant tendency to provoke hemorrhoids.

Dr. Jennings says:

“The strongly alkaline nature of this water renders it especially adapted for the treatment of those diseases in which the use of alkalies is of therapeutic value.

The large proportion of iron held in solution as a proto-salt gives it additional value as a chalybeate in cases of Chlorosis, Anemia, and general debility.

The depleting effects often following the long-continued use of alkalies are in this water entirely counteracted by its *tonic qualities*.

The *magnetic* properties of this water (which are strongly developed) may contribute toward its efficacy in certain diseases; this can only be determined by reliable empiric observation.

The following cases were reported by Dr. H. B. Shank to the State Medical Society, June, 1870.

CHRONIC OPHTHALMIA.

Of this I have witnessed several complete cures. I find in my notes of cases, that of Henry S. Crane, aged 70 years, who had been afflicted with ophthalmia eight years, and for the last seven years could not see to read; could see to read after using the water for two weeks; eyes now look well.

Laurence Croy had been partially deaf in left ear, following measles, for the last twenty years; was taken with inflammation of the eyes last February; came home to treat his eyes

with the water ; he recovered from his deafness, which latter cure was more than he hoped for or intended. Many other cases might be mentioned that have resulted equally favorably.

Jacob Croy (father of L. Croy) was cured of chronic diarrhœa contracted in the army ; he was unable to work for the past two years ; is now at work and calls himself well. He was a very pitiable specimen when he began the use of the water, being reduced to a mere walking skeleton.

Mrs. Betsey Haworth came here about one week ago from Iosco, Livingston county, aged 55 ; has been an invalid from rheumatism twenty years ; all the joints of upper and lower limbs affected, and the most of them immovably fixed ; legs and feet much bloated. Saw her on Monday, May 30 ; she had been using the water about one week ; bloating entirely disappeared ; could flex some of the joints that, as she declared, she had "not been able to move in months." In this case the water acted energetically as a diuretic but not cathartic. I found her suffering from a paroxysm of palpitation or rather hurried action of the heart, which she had formerly been affected with, but had not troubled her for the last year. She told me "it was driving the disease to her heart, but was curing the joints." I found little or no valvular disease of the heart, and attributed its inordinate action to morbid nervous irritability.

Dr. Bartholomew has kindly furnished me with a case of Bright's disease of the kidneys, recovered under the use of the Lansing mineral water. The following is from his notes of the case made after each examination : "Saw A. B. West, age 35, April 5th ; temperament sanguine ; specific gravity urine 1020, reaction alkaline, turbid, bloody, highly albuminous ; has lost eight or ten pounds in weight. Microscopic examination showed large amount of pus. Prescribed warm clothing, tinct. ferri chlo., also Lansing mineral water. April 11th, urine of acid reaction, gravity same, no blood, still albumen and pus, with waxy and granular casts ; continues to lose flesh ; pain on urinating. April 23d, urine acid, turbid,

albuminous, purulent, and bloody ; has had severe pain in region of bladder, also on urinating ; large amount of mucus mixed with the urine. By order of Dr. Smily, left off the iron but continued the use of the mineral water. May 3d, symptoms improving, but still some pus and albumen, reaction acid ; ordered to continue the use of the water. May 17th, urine of acid reaction, specific gravity 1020, with slight amount of sediment, and very little pus or mucus ; feels well ; has gained ten pounds in weight, and has resumed labor."

A good bath-house is in close proximity to the well. And fine hotel accommodations can be obtained in the City.

CHAPTER XIII.

FRUIT PORT SULPHUR AND MAGNETIC WELL.

LOCATION. ANALYSIS, &c.

Fruit Port is a new town, the result of Chicago enterprise, situated at the head of Spring Lake. It occupies a commanding position in the fruit belt of the State, and its proprietors promise that it shall soon become the center of the fruit trade on the Eastern shore of Lake Michigan. The company owns some 13,000 acres of land around the town, and the division, improvement, cultivation, and sale of this land, and the town lots in Fruit Port, was the first and main object of the company when organized. But when Magnetic wells began to create so much excitement in the popular mind, of course Fruit Port had to have one, so an Artesian well was bored which furnishes the strongest salt brine Mineral water in the State. The following is an analysis by Prof. Wheeler, of Chicago:

Temperature 48° F.	Specific Gravity 1.00718
<i>Grains per Gal.</i>	<i>Grains per Gal.</i>
Bi-carb. Soda..... 6.5156	<i>Chloride Sodium</i> ...464.0319
“ Lime..... 5.1100	“ Lime.....111.1110
“ Iron..... 7.5000	“ Potassium. 0.4312
“ Magnesia 4.1511	“ Magnesium 46.8072
“ Manganese 0.1050	Bromide 0.7666
—————	Sulphate Soda..... 45.9960
Total Bi-carbonates.....23.3817	Silica and Silicates. 10.6050
Alumina..... traces.	—————
Total Free Gas.....7 cub. in.	Total fixed Residue 679.7489

A new and elegant hotel has been put up, and a bath-house is always open to the guests.

CHAPTER XIV.

BUTTERWORTH'S MAGNETIC SPRING.

LOCATION, ANALYSIS, &c.

This Spring is situated in Grand Rapids, a handsome, well-built, well-drained, lively little city, on the Detroit and Milwaukee Rail Road, near its Western terminus. Excellent hotels and private boarding houses. A plain but comfortable bath-house of 20 rooms has been put in successful operation.

The water belongs to the sulphated class, and resembles that of "Bath," England, which has been very popular for a great many years. This water is useful, particularly where the secretions of the liver are torpid, and where saline Cathartics are indicated. This water is deserving more attention than it has received.

The water of the Spring was analyzed by Prof. Duffield, with the following result :

Specific Gravity.....	1004.
Constituents in Imp. Gal. in grains.	
Sulphate of Lime.....	90.190
Chloride of Potassium.....	11.790
" " Sodium.....	15.280
" " Calcium.....	7.330
" " Magnesium.....	50.240
Bi-Carb. Soda.....	6.003
" Lime.....	10.012
" Magnesia.....	7.020
" Iron.....	1.170
Silica.....	.617
Alumina.....	.494
Organic matter and loss.....	.801
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Total Mineral Matter.....	200.947

CHAPTER XV.

OWOSSO CHALYBEATE SPRING.

LOCATION, ANALYSIS &c.

Owosso is situated on Jackson, Lansing and Saginaw Rail Road at the crossing of the Detroit and Milwaukee Rail Road.

The Spring is very nicely situated, nearly a mile south of the business part of the town, surrounded by a grove and grounds which, if tastefully laid out and and cared for, would make a pleasant resort.

Owosso has the best chalybeate water in the State ; it was analyzed with the following result :

Bicarbonate Lime.....	25.667
“ Magnesia.....	19.094
“ Iron.....	15.920
Chlorides Sordium and Potassium.....	2.102
Silicia and Alumina.....	617
Total mineral in one gallon.....	63.400

In all cases when iron tonics are wanted, and when there is no gastric irritation, or tendency to visceral congestion, this water will answer the purpose entirely. Such cases as those of pure debility, and anæmia, will probably find all they need in this water. Chlorotic patients would undoubtedly be benefited. Indeed there are so many diseases and conditions of the system demanding iron mineral waters, and in which they are so decidedly beneficial, that this class of waters has been for a long time exceedingly popular, both in the medical profession and with the laity. The proportions of iron in the

Owosso well is quite large, four times as great as that found in the Red Sweet Spring of Virginia, the most celebrated chalybeate water in this country. The Carbonate of Magnesia is six times as much in the Owosso, as in the Virginia spring, but the latter spring contains a large quantity of Carbonic Acid gas, while Owosso has none, and consequently is comparatively flat to the taste.

CHAPTER XVI.

HUBBARDSTON MAGNETIC SPRING.

LOCATION, ANALYSIS, &c.

Hubbardston is situated in Ionia county, and is reached by the Detroit & Milwaukee Rail Road to Pewamo, thence by stage six miles and a half to the well.

Hotel and private accommodations are convenient.

This water was analyzed by Prof. P. H. Douglass, of the University of Michigan, and contains :

Bicarbonate of Lime.....	23.812
Bicarbonate of Magnesia.....	10.712
Protoxide of Iron.....	.154
Silica.....	.139
Organic Matter, none.	

Total Mineral Matter in one gallon.....	34.817
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Those who especially value the protoxide of iron as the peculiar form of chalybeate preparations best suited to the economy, will observe the presence of it in this water.* The small quantity of iron present does not necessarily indicate feebleness of action, for the water of the chalybeate spring at Harrodsburg, Kentucky, frequently induces a fullness and pain in the head from the iron element, while there is scarcely 0.50 grains to the pint of water.

A bath house is in connection with the well for the use of invalids and guests.

*That the water holds iron in this shape in solution, is questionable. Many of our best chemists deny the possibility of it; and all agree, I believe, that in laboratory practice, protoxide of iron will not remain as such a moment in contact with water.

CHAPTER XVII.

GRAND LEDGE MAGNETIC SPRING.

LOCATION, &C.

Grand Ledge is comparatively a new town of 1500 inhabitants, situated on Grand River, in Eaton County, 12 miles west of Lansing, on the Detroit, Lansing and Lake Michigan Rail Road. The name is taken from the immense ledges of rocks through which the river makes its course near the town. The surrounding country is rolling, well timbered and fertile, well supplied with water courses for manufacturing purposes. The town has two mineral wells, one of 600 and the other of 200 feet depth. Two hotels, a small bath house and several boarding houses. No analysis has been made of these waters, but they are recommended for the same diseases that all other springs of the State are.

Probably for the want of analysis, these springs have not attracted much attention yet. Until a spring has established a reputation, the spring goers must have an analysis to look at. After the reputation is made, of course they care nothing about the scientific details. Being situated close by both Lansing and Eaton Rapids, it is probable the water is like that of one or the other of these springs.

CHAPTER XVIII.

LESLIE MAGNETIC SPRING.

LOCATION, ANALYSIS, &C.

Leslie is a smart little town of 1000 population, situated on the Jackson, Lansing and Saginaw Rail Road, 15 miles from Jackson and 24 from the capitol of the State.

Three wells have been bored, the only one in use bears the following analysis from Prof. Kedzie :

Grains solid matter in imperial gallon.....	63.01
Bicarbonate of Lime.....	30.62
Sulphate of Lime.....	7.04
Bicarbonate of Magnesia.....	10.53
Bicarbonate of Iron.....	2.27
Bicarbonate of Soda.....	5.27
Bicarbonate of Potassa.....	4.55
Silicia.....	2.08
Organic matter.....	.65
	—————63.01

Free Carbonic Acid Gas in gallon, 13½ cubic inches.

This is a good Carb. Calcic water, possessing iron and free carbonic acid. A good bath house is in operation, and a convenient hotel for visitors. The proportion of lime is smaller than in some other Calcic springs of the State, and the proportions of iron, soda, potassa and magnesia, are considerably larger.

CHAPTER XIX.

FLINT'S MAGNETIC SPRINGS.

LOCATION.

These springs are situated in the town of Three Rivers, St. Joseph County, in the south-west portion of the State, at the confluence of Portage Rock and St. Joseph Rivers.

Divisions of the Lake Shore and Michigan Southern Rail Road, and Michigan Central Rail Road pass through the town. The town is on high ground in one of the best agricultural portions of the State, and is within the fruit belt. The isothermals for January show this section to be from 2° to 5° warmer than any other portion of the State.

No analysis of the water has been made. A very good bath-house has been erected.

The town has something over three thousand population, and visitors will find hotels convenient, churches, schools and newspapers.

CHAPTER XX.

THERAPEUTIC EFFECTS OF MINERAL SPRING WATERS.

GENERAL REMARKS.

It is possibly expected, it is certainly appropriate, that something more definite should be stated in regard to the special therapeutic effects of the mineral waters of Michigan, the diseases to which they are adapted, and the best manner of using them both internally and as a bath.

In the study of the Hydro-mineral treatment as a branch of scientific Hydrology, nothing has been so entirely unsatisfactory in practice as the "general indications," unless indeed it be the "general rules," which are forever set to a formula by almost every one of the profession who has attempted to write a line on mineral spring waters. A thorough practical investigation will convince any one that the forms set by authors under the quoted headings, convey no adequate idea of the diseases to be treated, much less any satisfactory plan of treatment. By carefully noting the errors of others, and his own success, he may imagine it is an easy matter to formulate his own experience into a sure and sufficient guide for others. On the attempt to perform the task, he will find it a never ending succession of changes of form, unsatisfactory when finished and incomplete as a guide. After much deliberation, which the importance of the subject really demands, it has seemed to me the best plan is to follow in the wake of Dr. James Currie F. R. S. who wrote the most scientific work ever given the profession on the use of common water in disease, and gives names, dates, places, symptoms, diagnosis, the detailed treatment of each case, and the result.

In this way the whole matter is placed before the reader and is subject to his analysis.

The cases here given are all taken from my case book, and the notes were carefully made at the time of treatment and on the spot.

Although these cases were treated at the St. Louis Magnetic spring, yet the principles engaged apply as well to all other springs, still leaving each its special province. It is not intended to show the virtues of any one water, but to elucidate the remedial benefits of all good mineral spring waters in the State, and my own views regarding the use of those waters in particular diseases.

Those diseases most commonly met with at the mineral springs of the State will be noticed at the greatest length.

I am so well pleased with the external application of mineral waters in the shape of baths, that with my present experience I shall never advise a patient of mine to visit any mineral spring that has not a comfortable and well arranged bath-house in connection with it. For my own convenience I shall use the numbers attached to the cases in the books from which they are taken.

IN RHEUMATISM.

The basis of the treatment of Rheumatism originally instituted by Dr. Broklesby (1764) was that by *alkalies*. Other remedies were used mainly as adjuvants, including *baths*, when the skin did not act freely. The same general plan of treatment is adopted to-day with singular unanimity by the Medical profession all over the world, while such names as Garrod, Tanner, Chambers, Furneral, Stevens, Parkes, Basham, Goodfellow and others, appear in the literature of this disease as warm advocates of this general plan.

Aside from daily clinical experience, which is the court of final decision in such matters, the alkaline and saline treatment seems to be the most rational, for it has now been abundantly proven that alkalies and salts aid in the disintegration, and increase the elimination of the morbid material in the blood, whatever it may be. We know that the blood in the

Rheumatic diathesis is deficient in its alkaline and saline quantities, and that there is a liability to fibrinous exudation. We also know that the action of alkalies and salts are to increase the alkalinity of the blood, by bringing up to the normal standard those essential ingredients, and thus control the tendency to fibrinous deposition. The particular alkalies used in treatment on the principle of *neutralization*, have been almost always the Carbonates and Bi-carbonates, Sulphates and Chlorides of Soda or Potassa, and Magnesia, taken internally in watery solution, and externally as a topical application.

All Mineral Spring waters therefore, that contain a sufficient quantity of alkaline or saline ingredients, to increase by their action the secretions of the kidneys, skin, and alimentary canal, may be expected to be more or less serviceable in the treatment of Rheumatism, particularly in its chronic varieties, while the less stimulating Springs will be useful in the sub-acute forms.

Mineral Spring waters have always been interdicted, by authors, in the treatment of sub-acute Rheumatism, but it seems to have been so on purely theoretical grounds. All Mineral Spring waters are stimulant, and it was on this fact that they were supposed to be contra-indicated in acute and sub-acute diseases. But a great deal of the stimulation of these Springs can be easily removed by letting the water stand and the gases escape, on which, frequently, most of the stimulation depends. The most persistently stimulant are the Chlor. Sodid and Sulphur waters. Other Springs, from the absence of nearly all stimulating solid ingredients, are scarcely deserving the name of being stimulant at all, after the gases have escaped. Of one hundred cases of Rheumatism coming either directly or indirectly under my notice during the last summer, there were only a few who failed to receive a reasonable degree of benefit. I am conscious of the power of other influential causes in effecting this result at all Mineral Springs, in other diseases as well as the one in hand, but it requires more hardihood than most minds—professional minds at any rate—possess, to ascribe to those influences the entire or principal

effects produced. I saw no cases of Rheumatism during its period of greatest acuticity ; probably from the fact that at that stage it is impossible for patients to travel, even if they desired to do so. But the following case certainly verges close to it, if it may not be included within that pale :

Case XXVI. "C. H. P. A young man of 30 years of age, was taken on 16th February with acute rheumatism which involved arms, hands, legs, and feet ; for three weeks he could scarcely be moved ; he was brought to the Springs thirty-two miles during the 4th week. He had fallen off 45 lbs. in flesh ; his legs were so swollen that his pants had to be ripped at the seam ; his pains at night still kept him from sleep."

This person used a hot bath every day at 3 P. M., and drank two pints of the cold water during the twenty-four hours. On the 4th day he could walk across the room, and in one month he resumed his business, cured.

All cases however do not yield so promptly, and the necessity of persistence in the use of the remedy is shown in the next patient :

Case CCXL. "A railroad contractor of Wisconsin, aged 46, weight 170, 5 ft. 7½ in., comes to the Springs on the 28th day of May with rheumatism affecting all his limbs, but more especially his arms and shoulders, so that he cannot use them for any purpose, not even dressing or undressing himself ; his shirts have to be sewed on and ripped off ; bowels constipated ; does not sleep well. His shoulder joints actually seem ankylosed, and are exceedingly painful when an attempt is made to get them more than a few inches from his body."

This gentleman left for home on August the 7th, and except a little stiffness still in the shoulder joints, had perfect motion and entire freedom from pain in every joint of his body. He has no difficulty in putting his hands over his head, though he cannot do so as quickly as he used to do. The water taken cold did not relieve his constipation, but by resorting to three glasses of hot water daily he had no further trouble of the kind. For the first two weeks, this rheumatic was really worse than when he came, and at the end of a month he was no bet-

ter, but he determined to "stout it out," and now he has the benefit of it, with which he is greatly delighted. His bath was 94°, 10 min. time, 8½ p. m.

Constipation is frequently a most annoying accompaniment of chronic rheumatism, and the relief of this trouble alone is a new lease of life even if the joint difficulty is not directly benefitted.

Case CCXXXV. "A gentleman of sixty years of age has been helpless almost, because of rheumatism, for ten years, affecting all of his limbs, his constipation is very obstinate, joints of hands and feet are sore, and enlarged by deposits. Hot bath daily; water *ad libitum*--not to exceed two pints in 24 hours."

This gentleman was at the springs two months. I could see but little benefit to his rheumatism, but his constipation was entirely relieved.

Two cases of sub-acute rheumatism were presented, marked with the singularity of being worse in warm weather, and the warmer the weather the worse they became. The case detailed is that of a young lady of Washington City, the daughter of a distinguished physician, now deceased. The other case was a young woman from the vicinity of Toledo. The cases are so identical that a description of one, is so of the other, except that the abatement of the disease in winter was not quite so great.

Case CCXXXVI. Has had rheumatism three years. Without any family tendency. Most all parts of the body have been subjected to it during that time. Manifested by no very severe pain or soreness, and swelling has only occurred at the ankles, tarsal, wrist and carpal joints; the complaint is not pain and soreness so much as *weakness* and stiffness, so that she has not the power in them necessary for the performance of their functions. She has not been able to walk down stairs for three months; in fact much walking on level surface soon makes her joints give out. The affected joints are in a constant state of perspiration. The disease gradually grows worse with the approach of warm weather, and cold weather

causes its gradual abatement. In all other respects her general health is excellent. The enlarged joints seem to be a thickening of tissue rather than deposition of chalky matter."

Besides the general bath and drinking, the hot and cold douches were used daily to the joints. The hot douche was found to answer best, I think. In one case I passed a current of electricity from 5 to 10 smee cells—according to the condition of the cells—through the joints every 2d day, but its benefit was questionable. However, one case improved by staying two months, and the other left too soon for me to judge of what might have been. These patients previously had been under skillful treatment, with little or no benefit. This type of the disease seems to be peculiarly obstinate to all remedies; fortunately it is rarely met with.

Case LXIV. "G. H. P., a portly man from Ohio has had chronic rheumatism for several years. Within a year it has become more active, so that he has been unable to do any work, or walk but little. If he takes a walk in the morning the muscles of his limbs soon get a "twisting" pain, and the soreness of his joints becomes more severe. His feet trouble him more than other portions of the body; frequently he cannot put on his boots for a week at a time. His joints besides being very sore, on motion are quite stiff, so that if he chooses to bear the pain, he finds that his movements are quite limited. His general condition and habits are good.

This person was at the springs four weeks, and some time before he left he could walk considerable distances with comfort; to use his own expression he "had not been as limber for twenty years." But there was still some little soreness in some of his joints. He should have stayed longer while he was about it and been entirely relieved as the next man did.

Case LIX. "A strongly built robust German of 30 years, from the southern part of Michigan is of a decided rheumatic diathesis. He has never been down in bed but once, twelve months since, which lasted him four weeks; yet every few weeks for several years some joint will pain him so that he will have to quit his business for three or four days, and for a

year this frequency has increased. His joints do not swell, but he notices that when one is painful it is also cold to the touch. He suffers greatly from constipation. (June 8.)

On October 1st this man was still at the spring, fighting it out. He seems to have been victorious, for his rheumatism has not troubled him for three months, but he "wants to get it out of his system," so he has found work to do near by.

Case LX. This is a dyspeptic and will be recalled after a while. "With all his other troubles he has rheumatism, involving his hips, feet, and back, so that he can scarcely move about. His feet are so sore and swollen that he can wear nothing on them but soft carpet slippers, while his hips and back pain him with every step which is neither steady nor sure." He was entirely relieved of his rheumatism before he left the springs.

Case CCXXIII. "W. I. L. New York. A tall spare gentlemen of forty years. Has had chronic rheumatism for five years. The effect of it is seen in his contracted limbs and crooked contour. He cannot comb his hair nor dress himself. His knees are very much swollen, very painful, and quite sore to the touch. He does not sleep well, sometimes not at all, from pain. His bowels are constipated and appetite poor." (May 9th.)

This gentleman left for his home on 25th of July. He was able then to stand nearly erect, and could walk with ease and without pain wherever he chose to go. His appetite was good and his daily habits regular. He has been sleeping well for some time, and dressing himself every morning. The swelling, pain, and soreness, have entirely left his joints. He took a warm bath every day, and drank two pints of water per diem, in small doses. For the first month, I find by the note, he got worse "right strait along;" at the end of that time he began to improve, and has gained splendidly. I remember the case as being one of the worst, and most intractable during the month of June, while rheumatics generally were getting well. The Hot douche to his joints,

though not mentioned in the notes, had much to do in relieving the local troubles.

Case LXXVII. "This is a case of gonorrhœal rheumatism. The patient has had gonorrhœa four times in the past few years, and three times it was followed by severe attacks of rheumatism. With one of these attacks he is here now. The knees, ankles, feet, and right arm joints are so much affected that it is with difficulty that he can move. In this attack he has lost sixty pounds of flesh." (June 30.)

By means of general bath at 94°, followed by hot douches to joints, and drinking three pints daily of water, he gained very rapidly for three weeks, the gonorrhœa then returned, which being checked, his rheumatism returned again, though not so violently as when he first came. It was finally subdued however, and he went home a better if not a wiser man.

IN THE DYSPEPSIAS.

Mineral Springs have generally gained more reputation from the cures and improvements made in patients suffering from some of the various forms of Dyspepsia than from any other disease. This is due in a great measure to the fact that in nearly all diseases of long standing or much severity, the digestion is sure to become more or less impaired. This impairment re-acts upon the original disease, and the disease increases the breach in the digestive functions, and both get worse.

Mineral waters, by building up the digestive power, giving tone and vigor to the general system, thus exerts a powerful, indirect, beneficial effect upon the original disease, and the patient is greatly improved. Such is the history of the celebrated Vichy waters of France, and of Ems, in Germany; and my experience in Michigan is, on this point, very satisfactory.

Where the alkaline treatment, with tonics is indicated, either in Dyspepsia or any other disease, there is no method of instituting that treatment which can compare with that of Alkaline Mineral Springs, for promptness, efficiency and last-

ing results. I am sure this statement will be borne out by all Medical men who have given the matter any attention.

By the alkaline treatment--in Dyspepsia particularly--I do not mean what is generally understood as being the only result, a mere palliation by the neutralization of supposed superabundant or abnormal acids, but a building up of strong stomachal tissue and increased healthy gastric juice and normal peptic abilities of the stomach, showing an alterative or restorative action—a restored life.

While I do not see that the water of Vichy possesses any one advantage over the Alkaline waters of Michigan in its remedial qualities, it is quite apparent that the latter have one great advantage in the possession of iron, for most Dyspeptics become anæmic and thin of flesh, and it is often difficult to get the ordinary Pharmaceutical preparations of iron to act beneficially in such cases, and another advantage is, the presence of free carbonic acid. Where there is torpidity of the intestinal secretions, some of the saline waters should be advised, and if the biliary secretions especially are torpid, the Sulphur waters are still better adapted. In some cases where the Dyspepsia is a secondary result of anemia, those saline waters *Chlor. Sodæ* containing iron, are particularly serviceable, because the impoverished secretions are more rapidly restored.

Case XXVII. "J. L. K., aged 52. 160 lbs. 5 feet 10 in. May 23d, 1871. A very energetic and prosperous business man. Fifteen months ago was taken with Diarrhœa, which, after lasting some weeks, produced dizziness in head and pains in right side, covering the region of liver, which gradually extended to left side and under right shoulder-blade; a feeling of discomfort and weight followed two or three hours after eating, and is by far the most constant and disagreeable of his discomforts. He has had to abandon all business, and during his sickness has fallen off 54 pounds while under a variety of pathic treatments; has spent several months at the sea shore and at several watering places. He drinks plenty of cold water, eats well of a general diet, bowels irregular,

troublesome Diarrhoeal discharges, and carries a white tongue." This patient suffers from slow digestion, which is somewhat painful. The food not digesting within the proper time, becomes weight to him, and the digestion not being perfect, causes the loose alvine discharges. As his digestion is improved in rapidity all his discomforts will fade away. He is advised to drink hot Magnetic water, in small glasses several times during the day. Full bath 80°, 3 minutes, to be followed by a short shower, after the first meal, some hours. Diet to be of heated milk and toast, with plain roasted or boiled meat at dinner; vegetables were to be added from time to time as he improved. Went home July 15 quite well. This patient improved very rapidly; his evacuations became firmer, his sleep became quiet and undisturbed, he gained strength and spirits and flesh.

The hot water was prescribed because it more promptly facilitates the processes of digestion and nutrition. He had been drinking two or three pints of cold water every day while at the spring, and it required too much of the energies of his debilitated stomach to heat it up to the temperature where it could be of service to him. By giving it to him hot, the powers of the stomach were harbored and increased, while at the same time his stomach was given no more work to do, than it could do well. He began with a diet that could be readily digested and assimilated, and it was substantially increased from day to day. The bath was given so as to be a good general tonic.

In this sort of cases I have found heated milk a most excellent adjuvant in the way of diet. If given cold it would have the same objection as cold water, and if given after it is boiled and the albumen thereby coagulated, it would be still more objectionable. The cause of this dyspepsia was too much brain work; the nerve forces proper for digestion were drawn off at a time when rapid eating made it necessary that they should be on guard. The disease being once established, it did not leave on the removal of the cause, it was too deeply rooted. These sort of cases are constantly being presented

by brain workers. I find in the notes of the case, that I gave him a "good start" toward recovery by a small pill of *S. quīn. et Stych. ter. in die*.

The next case illustrates a common form of dyspepsia in men who do business and eat with a "rush," and also the potency of the remedy used.

Case ———. "A hearty, robust, athletic man of 27 years, and 170 pounds weight; says that if not before he has finished his meal, very soon afterward, his stomach begins to "burn," and it lasts him from two to four hours; he says the absolute amount of pain is not so great, but the peculiar character of it, the location and the time of its occurrence—when he is most busily engaged—all conspire to nearly upset his mind, sometimes. He has "no peace;" when his stomach is empty he is as ravenous as a wolf, he eats, to have the burning pain again. When the burning is long continued he can eructate a little acid material and then gets relief. This state of things during the day makes him nervous by bed-time, so that he does not get composed to sleep till past midnight. The only kind of meat that he can eat is a little rare beef-steak. Vegetables of nearly all kinds "bloat" him. Parsnips however agree with him. He notices that the less water he drinks the better off he is, as an ounce or two will cause the the burning. A broad stripe of white fur runs down his tongue, pulse 70, good in every respect. Bowels regular."

Here is a very active out-door business man, who has been in the habit of eating a hearty meal in no longer than *five minutes* time. This is the legitimate result of it. His food is digested well as shown by his ruddy complexion and weight, (for he continues to eat in spite of the burning,) and good condition of his evacuations. The digestion is also performed within the time usually allotted to that function, but the act is accompanied by pain, from the very commencement, of a burning character. This is from a hyperæthetic condition of the mucous membrane of his stomach produced by throwing food into it not properly prepared by the masticators, and buccal secretions. The proper treatment consists in giving

some local anæsthetic : one of the best of these is carbonic acid gas. The St. Louis water containing a good quantity of this, is a remedy near at hand, and he discovered the first day that he could drink five times as much of it as he could of common water without any burning pain after it. His cure of course was only a question of time. Sometimes the nervousness produced by some of these forms of dyspepsia is the most troublesome and alarming symptoms to be combated, as in the following.

Case LXX. A prominent Ohio lawyer, of fine social attainments, has been suffering for some years with dyspepsia, produced by tobacco smoking, which became necessary to him as a stimulant, so that fifteen to twenty-five cigars a day were used. In the midst of business he found that this large number did not keep him up, so he took a little whiskey during the day, and to use his own language, "Tobacco and whiskey would kill the devil, much more a lawyer." His present condition is : "An hour after eating, a terrible feeling of oppression in the gastric region sets in which lasts two or three or four hours ; occasional eructation of food, but generally of wind only. He is exceedingly nervous, from an hour after his first meal he cannot keep quiet; he must walk, walk, walk, and only rest when nature is exhausted. He cannot stay in the house, cannot read, cannot attend to business ; he must be moving. There is no sleep for him, he tosses about in bed for hours; perhaps toward morning gets one, two, or three hours sleep; perhaps he gets none at all. The oppression and weight pass off, but the restless, turbulent nerves are never quiet. His bowels are regular, though he notices every few weeks a number of loose discharges."

I cut this gentleman's diet down at one blow to the level of heated milk and toast, and directed that it be raised gradually—that is, add a new element in small quantities every day ; advised him to drink his magnetic water heated also, several times a day in small quantities. He is to take a full bath at 8 p. m., water 90°, time, 10 minutes, and shower bath before breakfast. This gentleman was in the habit of taking

a cold towel bath in his room every morning upon rising, and I have found that persons who have acquired this habit do not get along nearly so well without it. My shower bath was intended only as an improvement on his own method. This gentleman's improvement was rapid and complete. In two weeks he was a new man, could sleep well, write his own correspondence, appetite good and general health well established. In a little while however, by a process of gorging, he produced an attack of acute indigestion, from which he scarcely recovered while at the Springs.

Case LX. J. M. B., the rheumatic I promised to recall, aged 55, weight 170, of strong athletic frame. "Has been a dyspeptic for several years; in his case the dyspepsia is manifested by the feeling of weight in the stomach coming on sometime after eating. He suffers very much from constipation, and within the past few months has become very nervous; has become timid and easily frightened by the most trifling circumstances; for instance, if he is out riding with a horse and driver, both of which he knows to be safe, the moment the horse goes faster than a walk he becomes frightened and wants to escape. His sleep is broken and disturbed by a thousand unpleasant sights and sensations—as that of one falling from a great height."

This patient was entirely cured without any change from his usual diet except the omission of coffee. He took a full bath at 70° to 80° every day, and drank from one to two pints of water *in small doses* during the twenty-four hours. Cold water in small quantity acts as a shower bath to the stomach in such cases, invigorating its normal actions, whereas in large quantities it seems to drown out temporarily functional activity.

Case XLIX. "An old rheumatic complains of great dryness of his mouth and throat, which gives him an inordinate thirst; he drinks from half, to a gallon of water during the day, still his mouth is dry, and when he talks to me I notice the sticky smack his mouth gives. He is troubled with flatu-

lency and two or three hours after eating, his eructations are very sour and burn his throat. He thinks it very strange that the alkaline water of St. Louis springs don't cure his 'acid stomach.'"

This character of dyspepsia is not so commonly met with, at least out of sixty-five cases I only find notes of three, and these are all met with in persons who had other diseases primarily. Therefore, I think this want of salivary secretion is due to general depravity of the economy. The want of the proper secretions being poured into the mouth, however, has produced a whole train of evils. For when he eats vegetables, the starch—or a large portion of it—is undigested, both from the want of the proper secretions being properly mixed with them in the mouth, and from the inundations that carry them to the stomach and the necessary lowering of gastric vitality by such large quantities of water at all other times, so that chemical action takes the place of vital action, and an excess of acid and gas is formed in the stomach. The treatment consisted in a remodeling of his bill of fare, leaving off peas, beans and potatoes, and cold drinks at meals; advising fresh meats, fish, &c.; with milk tea, to drink hot mineral water alternately during the day, with small quantities of cold water, and warm bath every morning. Of his dyspepsia he gradually improved, in spite of occasional back-sets from over-eating.

Case CCXVIII. "An active, young, western merchant, for sometime has been subject to attacks, somewhat frequent, of acute indigestion, which he attributes mainly to his having constantly a more chronic form, in spite of forty quack medicines he has tried. He has pain in the epigastrium with puffiness and swollen tympanitic abdomen. He complains that this wind troubles him constantly—if it remains, by the distention and borborygmus—if it passes off the annoyance is still greater. For some time he has been using whisky and water to relieve the gastric pains, but I fear the proportions were not very favorable; appetite good, eats a liberal mixed diet,

sleeps well, and is as strong as usual. About once a month has an attack of diarrhœa, which passes off in a day."

By drinking largely of water without whisky, a shower bath every morning, and the external application of hot water to gastric region for an hour after each meal, and a notable reduction of his vegetable diet, he was cured and returned home at the end of a month. Spirituous liquors are about the worst thing for flatulence; vegetables are bad. When the persons are not too old, nor too much debilitated, and it is not contra-indicated for other reasons, nothing reconstructs them sooner than well timed shower baths of these waters, taken cold, as we shall have abundant proof after awhile.

Case CCXIV. "A Southern lady of rather luxurious habits, after each meal has pain in epigastrium, which increases with the meals taken during the day, with vomiting after the last one. There is some tenderness on pressure over painful region, and some puffiness. The pain sets in as soon as the meal is finished, and if she eats no supper, she escapes the vomiting and preceding nausea of a few minutes duration. A larger dinner than usual, has occasionally produced vomiting, and the best remedy she has ever tried is twenty minims of chloroform swallowed before eating; she is also troubled with palpitation of the heart frequently. Twenty years, 5 feet 5 inches, 101 pounds; twenty five pounds less than usual weight."

Taking my cue from the effects of chloroform as a local anæsthetic, I directed small doses of St. Louis water, cold, every second hour during the day, and a reversal of her meal times, that is, to leave off eating breakfast instead of supper, so that the anæsthetic effect of the carbonic element might be well established by the time her first meal was taken; she was to take a small cup of beef tea only, in the morning, and a warm bath. She had no vomiting after this time, and her pain gradually wore away, while she gained one pound per day, until her lost weight was regained. Her heart palpitations ceased as soon as that organ was supplied with good

rich blood. This case will be called again under another score.

The following case may be useful to others :

Case CCXXXVII. "A tall, spare gentleman of fifty years, has been troubled for a year with tightness, constriction, and distress in the stomach after each meal, whether the meal be light or heavy. He has been a sufferer from obstinate constipation all this time. On arriving at the Springs, he was surprised to find that he could drink so much of the water without its causing pain at the stomach, so he poured it in without counting the glasses. I was called to his bedside the next afternoon, where he had been brought by what was emphatically a *watery* diarrhœa. I do not know how much went into him, but from the quantity that came from him, one could imagine that the soldiers of Iran and Azerbaijan had turned the channel of the Euphrates through him. He was on his feet, however, in a few days, and by the proper use of the water, was entirely cured of his dyspepsia and constipation."

IN PARALYSIS.

This is the disease which usually takes invalids to Michigan, for the benefit of the reputed Magnetic qualities of the water. Those who choose to deny the presence of that quality, will have no difficulty in finding other potent influences by which the paralysed are bettered. A few cases out of sixty-nine, that came under my immediate notice last year, will be detailed in elucidation of the general plan of treatment and its effects.

Case LXVI. "A lady from Indiana, aged sixty, weight one hundred and twenty, of good plump figure, had two slight strokes of hemiplegia, in February last, which left her right side nearly useless. By assistance, she can walk across the room, her left eye droops, her tongue is still somewhat affected, and the toes of the right side cannot be moved by voluntary effort, (June 18th.)"

In one month, this lady could walk a mile, without difficulty or assistance; the eyelid no longer drooped; the lost motion of the toes had been restored, and there was only a little numbness remaining. She took a full bath at 90°, 5 min. every morning, followed by a strong shower of cold water. This case presented the advantage of being of recent date, which cannot be said of the next one.

Case LVII. "A young man aged twenty-nine, weighing 135 pounds, of dark complexion, has been paralyzed on the right side since he was eighteen months old, caused by scarlet fever. The fingers of right hand are drawn in the palm of his hand; the forearm is flexed on arm, so that he cannot get his hand more than 12 inches from the shoulder. The tendons under his knee are so contracted that his leg is very much crooked, and he walked on the toes of that side, with a long heel to his shoe. Hot bath, to be followed by cold shower, and kneading of the effected limbs."

This young man so far recovered, as to nearly straighten his arm and fingers. The long heel to his shoe was not needed, for he could put his foot flat on the ground when he walked, he could open his hand rapidly, but it closed slowly, and without much strength. He was at the Springs three months.

Case XL. "An old gentleman—sixty years of age, has been paralysed on right side eight years, his leg has almost recovered, but his right arm is stiff, contracted and nearly useless. His voice is so near gone, and his articulation so poor, that it is with the greatest difficulty I can understand anything he says, consequently he gets off by answering the leading questions. Full bath 90° every day, and hot douche to arm morning and evening, with kneading." (May 10th.)

At the end of a month this patient came to bid me good bye; his voice and articulation had improved so much, that any one could understand him quite readily. The arm was as "limber as it ever was" and nothing troubled him but the sensation of "worms in the flesh" of his arm, and a shortness of funds which took him home."

Case LXXX. "A gentleman from Mississippi, 66 years of age, of light build, weighing not more than 140 pounds, had a paraplegia come on him with the suddenness of the lightning flash, five years ago. He has had neither before nor since any head or spinal symptoms to account for such a calamity, but his kidneys, he says, were not right for several years before this, and are worse since. Urine now scanty, high colored, and scalds as it passes away—which it does frequently though voluntarily. His lower limbs have dwindled into emphatically, "nothing but skin and bones" the muscles are the flimsiest ribbons, lying loosely between the two. By the greatest effort, he can get up a feeble, voluntary contraction of one or two of them in each limb. He cannot sit alone except by separating his feet, bringing his knees together, and resting his hands on them, unless he is in a chair, then the chair-back keeps him up, but he has not the power to take his body from the chairback, except by pulling some object in front of him. His legs are as cold as if his heart had ceased to beat before he left his beautiful State, and the skin so dry that it rattles beneath the hand. There is more motion in the right limb than in the left. In some of the muscles of each limb, I could get no reaction with less than sixty smee cells. Bowels constipated, appetite poor.

He is directed to have his lower limbs immersed in hot water, with hot douche to spine every morning. This water is then to be cooled down to 92°, in which he will take a full bath for a few minutes. Then he is to be thoroughly rubbed, and his limbs well kneaded. On every second afternoon he will have galvanic electricity applied to each separate muscle of his limbs. Hot pediluvia at bedtime; to drink two pints St. Louis water per diem. This is any thing but a propitious case.

The object of the hot water was to fill his legs with blood once more, so that some degree of tissue repair might be set up again, and a better temperature be preserved in those parts. The hot douche has the same effect by arousing to action the spinal cord and nerves. I have frequently noticed patient's feet and limbs grow warm under the influence of a

a full and strong flow of hot water upon the back. Methodical friction to the skin, and kneading the lifeless muscles thoroughly, is one of the most important elements in the treatment of paralysis. It not only maintains the necessary local circulation of blood, and the temperature, but it gives exercise to the paralyzed muscles, and this is a *sine qui non* in the treatment of the disease.

This gentleman had taken good remedies for his disease, at home, but the muscles of his limbs had received little exercise, and they withered away to the merest rudiments.

A clergyman of the Episcopal Church, of Connecticut, who is himself a paralytic, and a very intelligent gentleman and close observer, told me in consultation that he had given several remedies a thorough trial under the advice of skillful physicians, but that he gained on his disease only when he was under the hands of a professional shampooer in Boston. All physicians who are in the habit of treating paralysis know the value of energy on the part of the paralytic who is able to exercise himself, and prognosis may be safely made frequently, on this one point of character. The paralytic who can give exercise to his diseased limbs, without external assistance, but who is essentially a lazy person, has his chances for recovery very materially lessened; but more than this, Nature not being assisted in her endeavors to restore normal action, will after a while cease her strivings and the patient will grow worse. It is a common occurrence for old paralytics to say, that for a while they improved, then stood still, and finally got worse. On examination I have found that the changes were in exact proportion to the exercise the affected muscles received.

If this is necessary regarding the muscles that are under volitional control, be it never so slightly, it is of much more importance regarding those persons who have not this control, and therefore who cannot impart this exercise—daily rubbing, kneading, and the moving of the limbs in their natural motions by others must necessarily be resorted to, and its importance cannot be over-estimated. But to the case before

us: Up to the time of his coming to the Spring, he had improved for two years he thinks; but he had to put a whole year together in order to see the improvement, it was so very slight. He was at the Springs ten weeks, and he could see more improvement in any week of it, than in a whole year before.

The number of cells necessary to use in producing contractions of his paralyzed muscles was gradually reduced till I reached thirty, a number I used from choice, subsequently. Most of the muscles came under the control of the will, although they were too weak to be of any physical service. His limbs fleshed up some, his bowels became regular, appetite got better, and his urinary functions became once more healthy; a very important point, as I think his is a reflex paralysis from the kidneys. He could raise himself from the chair-back without assistance, and move his limbs considerably, and he ascertained, by the aid of crutches, that he could bear considerable weight on them. He should have staid at least six months, but circumstances were such that he had to return home.

Case LXXXI. "A lady 34 years of age, tall and of good contour, received a stroke of hemiplegia of right side, while bearing her eighth child, $4\frac{1}{2}$ years ago. For eighteen months she could not articulate well enough to be understood. For two years she could not walk without assistance. In fact at present, it is with difficulty that she can walk across the room. The deltoid muscle is still sufficiently paralyzed to prevent her raising her arm more than a few inches from the body, and when the hand is extended, a two pound weight will carry it down. The anterior tibial and fibular groups of muscles are so much damaged that the extensors on the inside of the leg carry the point of the foot inward and downward, and the ankle everted, so that when she walks, the toes drag and the foot rolls over on its external surface."

"She complains of swimming and dizziness of her head, and although she articulates most words plainly, it seems to be with effort, but she has very serious trouble in finding

words to express her ideas, so that her clever young companion constantly has something to do in keeping her supplied with the right word. Possibly this much is due entirely to a faulty memory. But the faculty of language of itself, is still seriously affected, for when the words, and the idea too for that matter, is furnished her as in reading, she leaves out some words, puts in others, and sometimes mixes the others up considerably. For instance ; in the office hangs a map with this inscription on its top border in large letters: "Map showing the location of the Northern Pacific Rail Road ;" she reads this as, "*The Map showing the locality of the Northwestern Rail Road.* This lady complains that on any attempt at mental effort, her mind becomes confused, and she can think of nothing." (July 2d.)

Treatment in this case commenced with the daily use of the warm bath, with methodical kneading of the paralyzed muscles, in a few days the shower bath was added to the course, and on the 17th localized galvanism from 30 smee cells was taken, and continued every second day. She drank from one to one and a half pints of the magnetic water daily. She improved steadily, so that at the end of eleven weeks she could walk around a square without assistance ; her foot no longer scraped the ground when she walked, and the ankle did not roll outward as before. Her arm could be carried several inches farther from her body, indeed to nearly at right angles to it ; she did not have the dizziness and vertigo she came with, and she could gather her words better, and read nearly correctly. She had increased 11 pounds in weight, and her strength was even in larger proportion.

Case XCVI. During an attack of pernicious fever in the summer of 1870 a young lady of Louisiana, aet. 30, one night without any premonition became instantly paralyzed in her right arm ; in forty-eight hours her left lower limb became paralyzed, and during the next day her other two limbs became similarly affected. The last limbs to come under the influences of the disease have recovered sufficiently to admit of the usual prehensory and locomotory movements. The

right arm and left leg are still utterly useless, but the muscles respond to thirty fresh smee cells. Five months after being paralyzed, she gave birth to a child, which was, and is perfectly healthy. For a year she has been taking strychnia ; S. B. Smith's battery, and for a while Jounod's boot." (July 15)

The treatment in this case opened with full bath at 86°, five minutes, daily. The cold shower was soon added, and finally the cold douches. After the first week, electricity was administered every second day to the diseased muscles. Her limbs were well exercised. In three weeks she was put upon a pair of crutches morning and evening, and at the end of eight weeks, when she left for home, she could walk in this way 200 yards or more. Prof. Richardson, of New Orleans, having advised her to continue the strychnia, I added pyrophos. Ferri and Phos. Acid Dil. to the prescription.

I find in my notes several cases of paralysis of the nerves of sensation. Here is one, both singular and interesting :

Case LXXXII. Is quite a celebrated western gambler, visits the Springs to get relief from a numbness, anæsthesia of the cushiony surface of the last phalanx of his fingers, and for what is worse, an impairment of his vision at short distances. Two troubles which interfere very materially with his professional work. A sheet of paper between the balls of his fingers feels quite thick, and he cannot detect the character of its texture, unless it is very rough. He can see well enough at and beyond a distance of two feet ; but within that distance, objects of small size especially, become blurred ; hence it is a great annoyance for him to read. He is of a quick, nervous and excitable temperament, and I should judge, just the wrong sort of a man for his business.

"He says his trouble commenced two months ago, with an intense neuralgia of the right side of head and face, which went off by or during two or three nervous shocks, which he thinks were slight paralytic strokes ; certain it is however, that since then he has had his present difficulties, and he never had them before." (July 2d.) Under the use of cold shower baths, he entirely recovered in two weeks.

"I have been told, that although this person is of a fidgety, high strung, nervous organization, that he has such absolute control over himself, that with "5,000 on a corner, he is as cool as an icicle;" but this coolness is only in appearance, really he feels all the excitement belonging to his avocation, and it is his close application to it, which has produced this effect upon those organs necessary to its successful prosecution."

Case LXXII. A gentleman from Ohio, came here on 7th June, with anæsthesia of hands and feet, produced by poison contained in richly colored cheese. When he takes hold of any object, it feels as if he had gloves on, and when he walks he raises his feet high above the ground, as if he was stepping over something, or had clogs fastened to them. This anæsthesia is not so complete, that he does not feel the resistance of the floor when he walks, nor does the nerves of his legs or spinal cord seem to be in the least affected, for the feeling of resistance is at once instantly transmitted to the brain, and he can walk either backward or forward with his eyes shut. By the use of friction and shower baths, he was cured and returned home at the end of three weeks.

I doubt that it was the "poison" in the cheese, so much as the quantity of cheese he ate, which caused his complaint. Temporary reflex anæsthesia is occasionally met with after alimentary engorgement.

SPINAL IRRITATION.

Six cases of this troublesome disease were presented to me during the summer. Five cases were in the person of females, and one in a boy of 14 years of age. The ages of the five were 19, 24, 26, 40, and 43 years; two were married and had borne children. Three were single. Four of the five had unmistakable uterine troubles. One was cured, three substantially benefitted; and one after a month's trial was not at all improved. The boy was cured.

Case CCLXVII. "A very pretty young lady from Ohio, two years ago lost her appetite, then she noticed a pain like neuralgia occasionally in her stomach, this increased in

frequency and severity. At that time, and ever since, she has suffered a great deal with head ache. She has pain between the shoulders, and there is some tenderness of skin on either side of spine, at that point. By pressure upon the upper dorsal vertebra, a sharp pain shoots through to the stomach. Has palpitation of the heart occasionally. Bowels constipated. She can walk only a short distance, from general debility, and a fear of increasing her troubles. She sleeps well, and she attributes her keeping up at all to that fact. Her feet, legs, and hands are always cold."

These symptoms, or some modification of them, existed in all the cases. Three were very poor sleepers, all had remarkably poor appetites especially for meat. In three, the dorsal vertebra alone were affected, in two the Dorso lumbar, and in one the cervico dorsal. In two, the headache was very severe, in one, palpitation of the heart was severe; and in one it was quite troublesome. In one, the uterine function was performed with terrible pain, and in one, violent attacks of gastralgia were frequent, which was ascribed to dyspepsia, of course.

The treatment in these cases was based on the recent pathology of Dr. Radcliffe,* that the disease is one associated with capillary contraction and the want of a due supply of blood to the spinal cord. The *spinal anemia* of Dr. Hammond.† The principles of treatment, therefore, after the removal of the cause, when it can be ascertained, are first, to improve the general strength and health; second, to augment the supply of blood to the spinal cord.

The tonic properties of the Magnetic Water with a liberal diet, regular exercise, and a full warm bath with a shower every day, I found sufficient for the first indication, and to meet the second, I directed the hot douche to be used on the spine, five to ten minutes—to be interrupted every one or two minutes if necessary—daily, and the ascending galvanic current for sixteen minutes to the spinal cord every second day;

*A system of medicine, by John Russel Reynolds, M. D., F. R. S. F. R. C. P.

†Diseases of the Nervous System,

the current to be broken every four minutes. This plan of treatment, I am inclined to believe will prove satisfactory in nearly every case, if persisted in for a sufficient length of time. But lesions or disturbances of Nerve tissue of whatever kind, either in its arterial circulation or the so-called molecular changes of its solid forms, is always slow in its processes of repair, and those who fall under the ban of these diseases grow impatient at their slow recovery, and of the eternal dosing which in some cases seems necessary, and treatment is abandoned too soon. Of all direct means, the hot douche stands prominently forward. The subjects of Spinal Irritation are generally thin of flesh, and the spinal column comes at once under the influence of the current of hot water, which should be sent with considerable force on those portions of the spine not too tender or sensitive to receive it, and to be of a temperature that will make the skin quite red. Water at from 105 ° F. to 110 ° F. will generally be borne very well. Sometimes, however, the hot douche produces palpitation of the heart, or nausea or a temporary prostration of the general strength. When this is not overcome by two or three trials, the cold douche must be substituted. It is then the secondary effect, the reaction which brings an increased supply of blood to the parts. In one of the cases here mentioned, the cold douche had to be used. It was tried in two other cases, but the neuralgiac pains were thereby increased for an hour or two, and it was abandoned. Mineral Waters, however, of the best tonic properties must be selected for the treatment of this disease, as it is probable that the internal administration of the water, and the consequent strengthening of the digestive and circulatory systems, is one of the most important items in the general plan laid down.

So far as I know, the pure water cure and Graham bread establishments of the country have signally failed in making any impression on this disease, except for the worse. A liberal diet of beef steak, eggs, cream and such things is very important.

DISEASES OF THE KIDNEYS, BLADDER AND URINE.

A large proportion of all invalids who visit Mineral Springs

have some affection belonging to one of the above classes, which for convenience, may be classed together here. Nearly all diseases of this class usually met with, terminate sooner or later in irritable bladder. There is very little variation in the symptoms of irritable bladder, so that there is little or no difficulty in making out its diagnosis. But irritable bladder itself is only a leading symptom of numerous disorders of each and all the organs related to the bladder, and even of that organ. To diagnose these requires not only sound knowledge of the anatomy and physiology of the organs and the pathology of their various diseases, but considerable tact in chemical manipulation, microscopic examinations, and the handy use of exploring instruments, with accurate powers of discrimination. Unfortunately these requirements are seldom met with at Springs either in Michigan or elsewhere.

Indeed the majority of physicians in general practice, have not sufficient work of this kind to do, to warrant them in making the necessary expenditures for a thorough and scientific examination of these diseases, and consequently their attempt at diagnosis is generally nothing more than a good opinion, but being given with that understanding, it is the best that can be done under the circumstances. This apology however does not and should not hold good in the case of those establishments visited by large numbers of persons every year to be relieved of these disorders.

The surgeon's office of these watering places should be fitted up with a small but adequate laboratory, with the necessary apparatus for making a correct diagnosis of these diseases, so that the patient may be informed at once, whether he is to be benefited by the water, or by any other mode of treatment.

So far as I know, the universal, and nearly the only instrument used at these Springs, is the urinometer and a piece of litmus paper; and if the matter was not such a serious one, it would be supremely ridiculous to see a man, who is either a physician or acting as such, attempt to diagnose between a score of serious disorders, by dropping his urinometer into a little vessel of urine, and by wetting the litmus paper, and to

hear the miserable bosh regarding the specific gravity, acidity or alkalinity of any particular specimen of urine, and the exact (!) pathological lesion with which the patient is suffering.

All such procedures are downright swindles. No physician, whose opinion is worth having, will attempt to give a fair diagnosis on any such evidence as can be obtained from a mere questioning of the patient and the specific gravity and chemical reaction of the urine, and nothing more. It may be set down as a rule, that whoever attempts it is a rank Charlatan.

In persons of certain temperaments these diseases have a very dispiriting and depressing influence. They spend their money freely and without stint, on any and every scheme that offers the shadow of a hope of relief. They wander from one Mineral Spring to another, and at each place are subjected to nothing more nor less than a robbery, because their disease is not sufficiently examined into. I have seen men almost in hopeless melancholy from their frequent disappointments. The Springs of Michigan are no exception. They are so all over the country. These diseases improve slowly, even under the most favorable circumstances. It is idle to expect cures in a few days or weeks. Months may be required, and it requires no little philosophy on the part of the invalid, to wait patiently for so long a time ; and hence the greater importance of an intelligent and thorough examination by all the means at the command of the Medical profession. These diseases are by no means intractable, and when fully understood, can be mastered. This requires labor, study, skill, delicacy, and a sacrifice of personal feeling ; but the reward of great success is offered to those of the profession who choose to make the effort.

The old maxim of "remove the cause and the patient will get well," does not apply with much force to irritable bladder. This irritation will continue months and years after the cause has been removed. But, nevertheless, remove the cause, whether it be gouty or rheumatic inflammation, or any of various diseases of the prostate gland, renal disease, calculus, lithic acid diathesis, lithates phosphates or oxalates in the urine,

chronic inflammations, fissure, piles, or what not, and then, the best remedy that I know of, is some alkaline Mineral Water as a drink. Instead of opiates, either in pill, suppository, or plaster, a full warm bath in the evening is far preferable. To this simple treatment most cases will yield in due time.

In a great many cases acidulo alkaline Mineral Waters will remove the cause, that is, it will cure the disease on which vesical irritability depends; such a disease is the lithic or uric acid diathesis.

At one time there were very serious objections raised to alkaline Springs in this disease, on the ground that the stomach became irritable, and that although the excess of uric acid might be removed, yet a worse evil was left behind in the shape of deposits. D'Arcet was the first to point out, while at Vichy, that this objection rests entirely with carbonate soda waters, and that it does not apply to bi-carbonate soda waters, with excess of carbonic acid. These waters being of milder taste, not irritating to the stomach, and the excess of carbonic acid maintains the earthy salts in solution, after the alkali has caused the uric acid to disappear.

Purpurine in the urine is always connected with some organic or functional derangement of the liver, and hence, some of the sulphureted waters, like those at Grand Rapids, will be of great service, by relieving torpor of liver, &c.

Deposits of the earthy salts are produced most frequently by some form of dyspepsia, attended with considerable depression of spirits; in such cases alkaline waters, with or without iron, according to the nature of the case, should be selected. In fact, the two prominent indications in nearly all cases of vesical, urinary or kidney disease, is to keep the functions of the skin in active operation, which is best done by vapor or warm baths; and to give tone to the digestive organs by means already indicated. The diet, in all cases, should be confined to those articles that the patient can readily digest, instead of watching the chemical analysis of every mouthful he takes.

IN THE NEURALGIAS.

Neuralgia follows essentially in the wake of anæmia, or

as Romberg somewhat poetically has said "Neuralgia is the prayer of the Nerve for blood." Anstie says, "It is universally the case, that the existing condition of the patient at the time of the first onset of the disease, is one of debility, either general or local." * * * * * Although a considerable number of neuralgiac patients are so far healthy in appearance, that they have a fairly ruddy complexion, and a good amount of muscular strength, it is impossible to admit that these facts disprove the existence of debility, either structural or functional, *in the nervous system*, for the commonest experience teaches that such debility does frequently co-exist with a great robustness and development. * * * * *

John Erichsen says : "Neuralgia is almost always associated with some want of power." Aiken gives it as his opinion, "That all neuralgias are symptomatic of more or less grave organic lesions, or some of the debilitating cachexias."

With this view of the nature of the disease, which is received with great unanimity by the Profession, it is easy to comprehend the benefit and advantages of the splendid tonic properties of the Michigan Mineral Waters. The quiet, persistent, restorative powers of these waters, the inexplicable alterative effect, is such as to make many of the most obstinate and protracted cases yield to their influences. In fact, there are few diseases more amenable to the remedial virtues of these Springs than neuralgia. But no sudden and miraculous cure must be anticipated by the invalid, like those recorded in Holy Writ. While there are no winged angels at these Springs to disturb the waters, that he who plunges in first thereafter may be healed, it requires a great deal of the same patience that kept the crowd of sick and crippled waiting on the porch that overlooked the pool of Siloam, for that happy event to occur.

The effect of these Michigan Waters is produced by natural causes easily understood. The slow but sure building up of the man. A profound change in the organic and functional condition of the being, it were idle to suppose would occur in a day.

Twelve cases of the most intense neuralgia came under my notice last Summer. Eight were males, four females. Six were of the sciatic, six of the trifacial. The shortest duration of the disease in any case, was two years ; the longest twelve. The average duration 8 years. Of the trifacial cases the pain in 2 was on the temporal bone, 1 on the maxillary, 1 covered the occipito-frontal, 1 frontal-*clavus*, and 1 parietal-*clavus*. Of the sciatic cases the pain in 2 was just outside the pelvic foramen, involving the hip joint ; 3 in the femoral portion, and 1 the inter malcolar. Of the cases involving the head and face, 2 recovered ; *clavus*, 2 greatly improved, 1 slightly improved, and 1 not benefited at all. Of the sciatic cases, 2 recovered; 2 greatly improved, and 2 not benefited at all. Most of these cases had been under able medical advice previously to their visit to Michigan, so that they had not failed of being cured for want of professional skill. Prof. Stone, Prof. Parrin, Prof. Musey, Prof. Pancoast, and Dr. Washington Atlee had each of them an old patient in the list. The shortest time spent at the Spring by any patient, was six weeks ; the longest time, seven months ; average time, three months.

Aside from these obstinate and protracted cases, there were scores of others of every grade of severity. The great majority of these were relieved entirely.

The method of using the water in this disease occupied every diversity of form. Two pints of cold water were generally administered daily, usually in small doses ; if circumstances indicated, a portion was directed to be taken hot, or otherwise modified. The external application of the water was generally of a full bath at 90° F., with or without a cold shower. Some cases could not bear cold water at all, others required baths at always over 100° F. In the inter-maleolar case, the hot sitz bath, the hot vapor, and the hot air-bath to the lower limbs were faithfully tried, on the principle of Radcliffe, that pain is the expression of bloodlessness, and that the disease possibly existed in the extreme peripheries of the sciatic ; but to no purpose. In this case greatest benefit was

obtained by the application of the cold douche to the spine. It was tried in three other cases of sciatica, but increased the pain. Hot douche to spine caused considerable disturbance with the heart for an hour or so after the bath in two cases, and was of no benefit in several others. Galvanism was tried in two cases of sciatica without benefit, in one case of clavus it was temporarily. In two cases, (not included above,) after the use of the water for two months without benefit, the orthophosphate of iron, with quinine and strychnine, was given in addition to the hydro-mineral treatment, with advantage.

Beside the beneficial effects of the Mineral Water of the State, the climate of Michigan is peculiarly adapted to the treatment of nervous diseases; it is *tonic* but not so dry as to be stimulating. Hence, in an affection consisting largely or entirely of debility and irritability, local or general of the nervous system, such as neuralgia, a constantly stimulating influence, such as very dry atmosphere, highly charged with ozone, and modified electrical conditions, will be most likely to increase the already existing pathological conditions.

Minnesota has a dry and stimulating atmosphere, and nervous diseases are in large proportion in that State, and increasing every year, when severe and protracted removal to a less stimulating climate, is the only cure. It is therefore, reasonable to suppose, that by reversing the above climatic conditions, which seem to foster and aggravate nervous diseases, the result will be entirely different. Observation and experience seem to confirm this reasoning.

CHAPTER XXI.

MICHIGAN AS A SUMMER RESORT.

FOR CONSUMPTIVES.

The most diametrically opposite views prevail in the Profession, regarding the climate necessary for, or best suited to, consumptives. Cold, warm, dry and moist climates have each their advocates. These different opinions have frequently been formed upon a negative sort of evidence. The observation of one whose position enables him to judge, is that the cold and dry climate of Minnesota is not suitable for consumptives, therefore he recommends the moist, warm climate of Florida. Another witnesses the constant deaths from consumption in Florida, and recommends the cold, dry air of the upper Mississippi country. Very seldom is there any distinction made as to the variety of consumption, for which this or that climate is recommended—and herein probably consists the greater cause for the prevailing differences of opinion on the subject.

The most recent, and probably the best authorities on climate adapted to those effected with pulmonary consumption, state that for cases of the disease of inflammatory origin, the inland climate of the upper Nile, or the warm, moist, moderately stimulating climate of marine localities, is best adapted. And that cases of scrofulous character, should search for dry and pure air at considerable heights above the sea-level, as the high plateaux of the Andes. Minnesota is condemned because it is not high enough* above the sea level. Another author,† himself a consumptive, who has long favored Mentone as a winter resort for consumptives, is a warm advocate of England, as their summer resort.

*Pulmonary Consumption, Its nature, variety, and treatment. Drs. Williams.

†On the treatment of Pulmonary Consumption. Dr. J. H. Bennett.

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He says: "I am fairly warranted, on my own personal experience, in stating that there is no summer climate in Europe so good for consumptives as our British insular climate, where we are constantly screened from the rays of the midsummer sun by an atmosphere full of watery vapor. I attribute in a great measure my own recovery to my having withstood the temptations of summer travel, and to my having returned home year after year. I may add that my experience with others has been identical. Every Spring, for the last twelve years, I had, at Mentone, where I spend the winter, to direct the movements of a considerable number of consumptives, whom I have helped on throughout their Winter sojourn. Many will travel, will go to Switzerland; many are obliged to remain in the vicinity of the locality where they are to spend the ensuing winter, owing to *res angusta domi*; but I invariably use my influence to induce them to go to the higher mountain regions. Every autumn, when we all meet again, I find that those who have returned to England, and have lived there in the country, have done the best. Nearly all my best cases during ten years have been persons who have returned regularly to England, who have even there sought cool, healthy country localities, and who have gone North in our very hot weather."

The California Physicians now generally recommend consumptives to go to the warm, moist climate of the southern part of their State, especially in Winter. Dr. Halch* urges the mountain ranges, 7000 feet above sea level, as the best resort in summer.

Dr. Hawley† who has made considerable inquiry into the effects of the climate of Minnesota upon consumption, gives his opinion that except in the first stages, before there has been even a partial expulsion of tuberculous matter, the disease is greatly aggravated by that climate. In the earliest stages, the climate is favorable, indirectly however, by its stimulating effect upon the system generally. Dr. Sweetny, of the same State says, that 90 per cent. of consumptives will die

*Transactions of American Medical Society, 1871. † Ibid.

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within two years ; and that about two-thirds of the cases originating there were of known predisposition.

So far as I have been able to analyze quite a number of reports on climatology with reference to this particular disease, I believe all those cases of pulmonary consumption induced by inflammatory action, possessing a persistent local irritation, can only be relieved by a climate that is soothing to the pulmonary mucous surfaces. Moisture and warmth of atmosphere are essential to this. Therefore, Florida for the winter months, presents these qualities, but the marine localities possessing an atmosphere stimulated by salt, irritating of course, would not seem to be best for these cases. St. John's river or Aiken, South Carolina, would be preferable. But in summer time, either of these localities is too warm. The excessive heat is debilitating, and the patient is pulled down instead of being built up. It strikes me, however, that Michigan or the Lake Country, presents the desirable requisites of climate for this class of patients in summer. Besides, the nights are cool and refreshing, strengthening sleep is easily procured which readily overcomes any debilitating effects of a few hot days. Beyond this particular class of cases, I do not think any thing beneficial is to be derived by consumptives from Michigan climate.

Consumptives visiting the State should avoid sulphur waters, and waters holding much, if any, lime in solution. So far from being beneficial, the whole class of lime preparations are now considered injurious to tuberculous patients.

"Dr. Heberden* paid great attention to this subject, and insists upon the paramount importance of the purity of water, and even went so far as to recommend the use of distilled water. He observed that water loaded with lime proved extremely pernicious. And a striking coincidence is furnished by M. Warner, of France, who observed that in certain parts of the province of Sologne where the vegetable mould is very shallow and contains no trace of lime, neither consumption nor calculous diseases prevail. I would also add that the use of hard water, especially by consumptives or persons pre-

*Consumption: its Pathology and Treatment, W. M. Logan, M. D.

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disposed to consumption, is now seriously objected to by intelligent physicians, prominent among whom are Drs. Henry Hartshorne and B. W. Richardson. Dr. Frick of Baltimore analyzed the blood of four cases during the existence of *crude* tubercles, and states that, among other deviations from the normal standard, he detected an increase of lime, the quantities in the different cases being respectively .272, .257, .276, .283, remarkably contrasting with .183, the normal proportion."

CHAPTER XXII.

OTHER PLACES OF INTEREST.

Detroit is the Metropolis of the State and has a population of 90,000 inhabitants. It is the oldest city in the Northwest, the French having settled there and built a fort in 1647. It did not amount to more than a trading post, however, till after the cession of the surrounding territory to the United States in 1796. Since then the growth has been steady and of the most healthy character. As around all old commercial centers wealth has accumulated, this in turn has been spent carefully and judiciously in building up one of the most beautiful and substantial business places in the west. The streets are wide, well-paved, and clean, and the homes of the people have an air of comfort that I have seen nowhere else out west. No day while in Michigan did I enjoy more than the one spent in walking about Detroit, an entire stranger, visiting many places of interest, without having even the "eyes of Delaware" upon me. Detroit has a Medical College and an excellent Medical Journal.

ANN ARBOR

is an hour's ride from Detroit, and is the seat of the celebrated University of Michigan ; one of the most magnificent institutions of learning in the world. Over eleven hundred students were in attendance there during 1871 ; of these, 440 were in the department of classics and science, 300 in the department

Other Places of Interest.

of Law, 320 in the department of Medicine and Surgery, and 40 in that of Pharmacy.

The only charge for tuition in this institution is ten dollars per annum ; admission fee of ten dollars for residents of the State, and twenty-five dollars for non-residents, is required. The annual expenses, including *board, clothing &c.* for several years has been on the average \$360.

The University Medical Journal is published here.

THE SAGINAWS.

Our first care was to learn their geography.* There were Saginaw City and East Saginaw, with the adjacent villages of Florence, Carrolton, and South Saginaw ; comprising in all a population of 25,000 souls. The Saginaw River runs between the Saginaws, and is crossed by three substantial bridges ; the street-cars running from one town to the other. The river is navigable for vessels not drawing over eleven feet of water, and is seventeen miles in length, taking its rise just above Saginaw. The trade of the river is estimated at \$20,000,000 a year.

EAST SAGINAW

claims to be the commercial center of the Valley, being the seat of the State Salt Inspector's office, and of the Saginaw Valley Lumberman's Association. It has many fine blocks of houses, is lighted with gas, and has miles of brick sewerage. It has two street railways, a brick skating rink, public halls, Nicholson pavements, and all the necessary belongings of a live, thriving city.

From the cupola of the Bancroft House can be counted the tall stacks of thirty-five saw mills, nine shingle mills, and thirty salt blocks, all in active operation. There are eight churches, and the school property of this and Saginaw City is greater in value in proportion to the number of children than in any other town in Michigan. Its present population is

* "A trip to the Great Saginaw Valley," June 1871, By Laura Ream, Indianapolis, Ind. 7.

Other Places of Interest.

13,000; in 1850 it was only 17. It supports two daily and three weekly newspapers, one of which is a German paper.

The Bancroft House, strange to say, was the first house built.

SAGINAW CITY.

This is the oldest settlement in the Valley, and has a population of 10,000. A trading post was established here, and a fort built for its protection, as early as 1812. It became an important fur-trading point in 1836, when vessels began plying between it and Detroit. It was then known as Pontiac, but eventually took the name of Saginaw, which in the Indian dialect means "a place to camp." It is now a handsomely built and substantial city. It can boast of a grand hotel, the Taylor House, and of a splendid Union School building. In the general distribution of splendid school buildings, I do not need to give its length and breadth, but I wish I had space to describe the best jail in the North West. A clean, well ventilated, wholesome jail is such a rarity in this Christian land that the citizens of Saginaw should have credit for one. I might almost call it a cheerful jail. And it is not expensive either.

It was not necessary to inform us that we had arrived at the region of lumber and salt. There were saw mills to the right and to the left of us as far as the eye could reach. There were booms of logs on either side of the river, and up the streams emptying into it were logs by the million—"at least one hundred and fifty miles of logs," I was told, waiting their turn to be sawed.

The salt wells at Saginaw are considered the best in America, containing a larger quantity of salt of purer quality. No less than 645,576 barrels were manufactured during the year 1870.

The next thing in order was a visit to Wenona and Bay City, seventeen miles down the river, at the mouth of the great Saginaw Valley.

BAY CITY.

was another vast surprise. Think of it. An Opera House

Other Places of Interest.

worth \$100,000, in the wilderness ; a hotel on as grand a scale ; banks with half a million of capital ; eight school houses ; (one worth \$6,000,) and the biggest saw mill in the world. There is a manufactory of wooden water and gas pipes in successful operation, with a capital of \$200,000.

I visited Mr. Brewer's mill, which, in the distance, I mistook for a fashionable watering place. Its entire cost, including engine, was \$150,000. All the work about the mill is done by machinery. This mill has two gang saws, with eighty-seven saws in each gang, besides one large circular saw, two slabbing saws, and several small circular saws. The yearly capacity of this mill is 25,000,000 feet. A few feet distant from this building is a "salt block." I also visited the mill of H. W. Sage & Co., at Wenona, which has the largest capacity of any mill in the Valley. Not long ago it sawed 370,797 feet in twelve hours.

KALAMAZOO.

The State Insane Asylum is situated at this place, a young city of 9,000 inhabitants. Dr. E. H. Van Duzen is Medical Superintendent. On November 1st, 1871, there were 296 under treatment.

Extensive improvements were made to the institution during the past year, and it compares favorably with any in the country.

Kalamazoo has also a college which bears the name of the town ; the attendance during the past year was 160. Large sums have recently been added to the endowment fund, and valuable additions of apparatus made to the department of Natural Philosophy.

An annual Horse Fair is held at this place, which is one of the best in the west.

WEALTH RESOURCES OF MICHIGAN.

Few persons outside of Michigan have any adequate idea of the vast resources of that State ; and visitors to the State are constantly amazed at the wonderful development of special interests.

Wealth and Resources of Michigan.

SALT.

The following table showing the amount of salt produced during the past three years is taken from the State Salt Inspector's report :

	1869.	1870.	1871.
To May 1st, bbls.	34,150	65,434	124,870
May..... ".....	52,444	44,107	51,614
June..... ".....	75,336	82,561	107,232
July..... ".....	101,773	116,110	94,160
August..... ".....	91,583	84,391	108,032
September... ".....	58,573	87,266	120,257
October..... ".....	208,378	139,417	94,728
	<hr/>	<hr/>	<hr/>
Total.....	549,237	618,282	700,893

IRON.

Michigan is rapidly becoming the great iron center of the United States. She now produces the ore from which is smelted over one fourth the iron made in the United States, and supplies the demand for ore from over 200 furnaces in Ohio, Indiana, Pennsylvania, New York and other States.

The iron region is in the Upper Peninsula, where there are 29 mines in operation, which produced about 1,000,000 tons of ore during 1871. The product of Michigan furnaces amounted to about 55,000 tons of iron for the same length of time.

LUMBER.

The lumber estimates of Michigan constitute an important feature of its wealth, and the traffic in pine and oak timber is one of great magnitude. In the markets of the world, Michigan pine and oak stand pre-eminent. The northern part of the State is an immense pine forest. The best qualities of pine are found in what is known as the Saginaw District. The lumber centers are Saginaw on the East and Muskegon on the Western shores of the State. At this time* it is impossible to obtain reliable estimates of the amount of pine lumber

* January, 1872.

Wealth and Resources of Michigan.

manufactured in the State during the year 1871. The amount manufactured in 1869 was 1,999,804,431 feet; in 1870 about 2,400,000,000 feet and in 1871, notwithstanding the supposed shortage of logs, over 2,000,000,000 feet of pine lumber was marketed, which, at an average value of \$15 per thousand would bring over \$30,000,000. The destructive fires which swept over the State involved the loss of immense quantities of standing pine, but much of this pine is still standing, and if cut during the winter will be saved to the manufacturers. In view of this fact the lumbering operations of the winter of 1871-72 will be on a more extensive scale than ever before known in the history of Michigan. The season will, in a measure, regulate the log crop, but it is safe to estimate that it will exceed three billions of feet for 1872.*

FRUIT.

The fruit crop of 1871 was somewhat injured by the dry weather. Peaches were abundant in numbers, but in size and quality, were below the average of the Lake Shore region. The quality rather than the quantity, brought down the price in the Milwaukee and Chicago markets, but we estimate the value of the crop of the Lake Shore region alone at \$759,000. There was a fair crop of apples, although this was also injured by the codling moth worm and the drouth. The apple crop of the Lake Shore regions strictly, did not exceed \$100,000 in value, but the exportations including the product of the interior undoubtedly reached \$500,000 in value. Grapes were very good and abundant, and the Lake Shore yield amounted to 500 tons of the value of \$50,000. The small fruit crop was also somewhat damaged by drouth, but was abundant and generally profitable, amounting in value on the Lake Shore to probably \$250,000. The best estimate of the value of the fruit yield on the Lake Shore in 1871 is \$1,150,000.

COPPER.

Michigan contains the largest copper mine in the world ;

*Michigan Almanac, Detroit.

Wealth and Resources of Michigan.

the Calumet-Hecla. In October of last year it turned out 825 tons of mineral, of which 83 per cent. was pure ingot copper, and during the year it yielded two-thirds of all the copper mined in the United States, or about 16,000 tons of mineral.

PLASTER.

The best plaster beds of the State are at Grand Rapids, which yield an annual supply of 40,000 tons of rock plaster. 45,000 barrels of calcined are shipped from the same place.

MAGNETIC AND MINERAL SPRINGS.

During the year of 1871 it is estimated that the Springs were visited by about 7,000 persons, at a cost while in the State of \$350,000. No doubt this number of visitors will be largely increased from year to year as the facilities for good accommodations are increased.

FINANCES.

The aggregate value of real or personal property in the State was, for 1871, \$630,000,000 on which a tax was levied of \$757,000.00.

Total interest bearing debt, 2,321,000,00.

“ non-interest bearing debt 34,292,78.



WILD SPORTS.

FISHING.

The rivers and lakes, large and small of Michigan abound in a variety of the finest fish, and as angling is a sport in which both sexes and nearly all ages may join, it is a sport more generally indulged in where large numbers of persons are gathered. In the rivers, at least in the middle and upper portions of the State, pickerel, fine perch, and mullet may be readily caught. I have frequently seen, while at St. Louis, pickerel two and a half and three feet in length, and weighing several pounds, taken from the Pine River.

The elegant speckled trout is caught in the small lakes, and the famous salmon trout is taken in large numbers from the small bays making out from the large lakes, especially Lake Huron.

SQUIRREL SHOOTING

is one of the best fall sports. I have known a boy fourteen years of age to kill 30 in one day of black and gray squirrels.

DEER HUNTING

is good in October, and there is a large quantity of this game. Almost every day after this time venison is brought into the larger towns in the upper part of the State.

BEAR HUNTING

is still kept up with considerable interest to those fond of the sport, and a sufficient number of animals may yet be found for purposes of excitement in the chase.

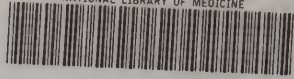
Muskrats, beaver, otter, rabbits, minx, wild cat, and several other varieties of wild animals may be found in considerable numbers.

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J. Hyg
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